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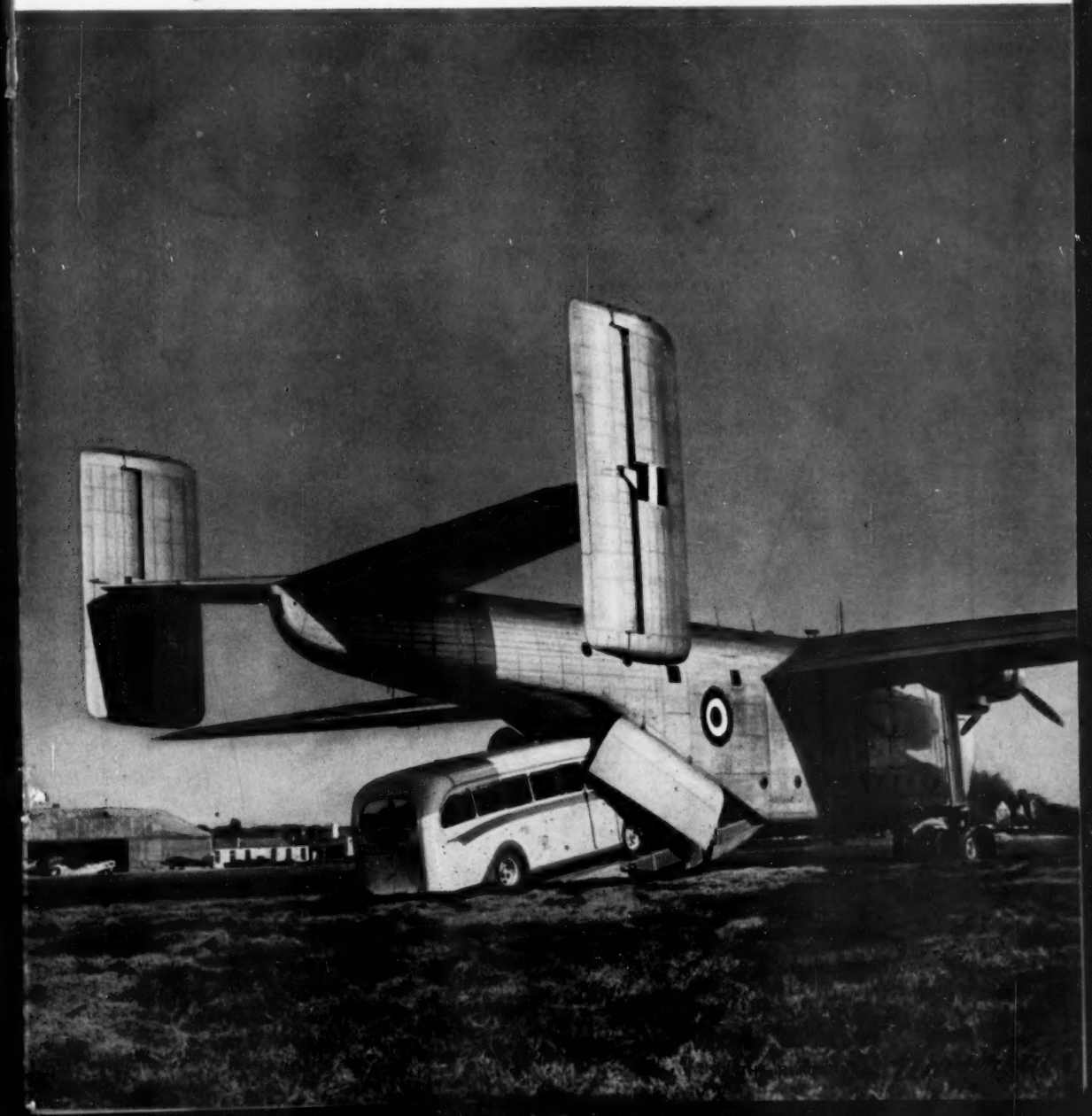

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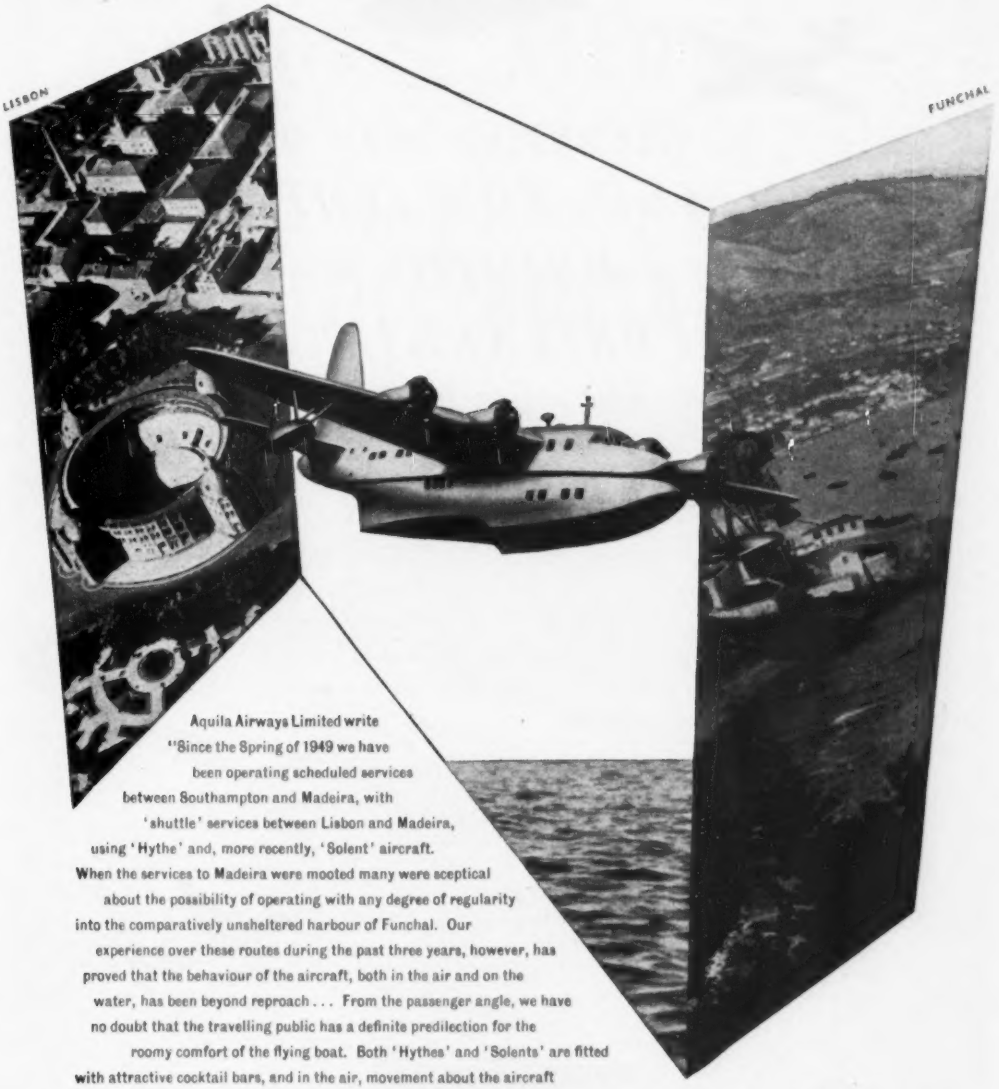

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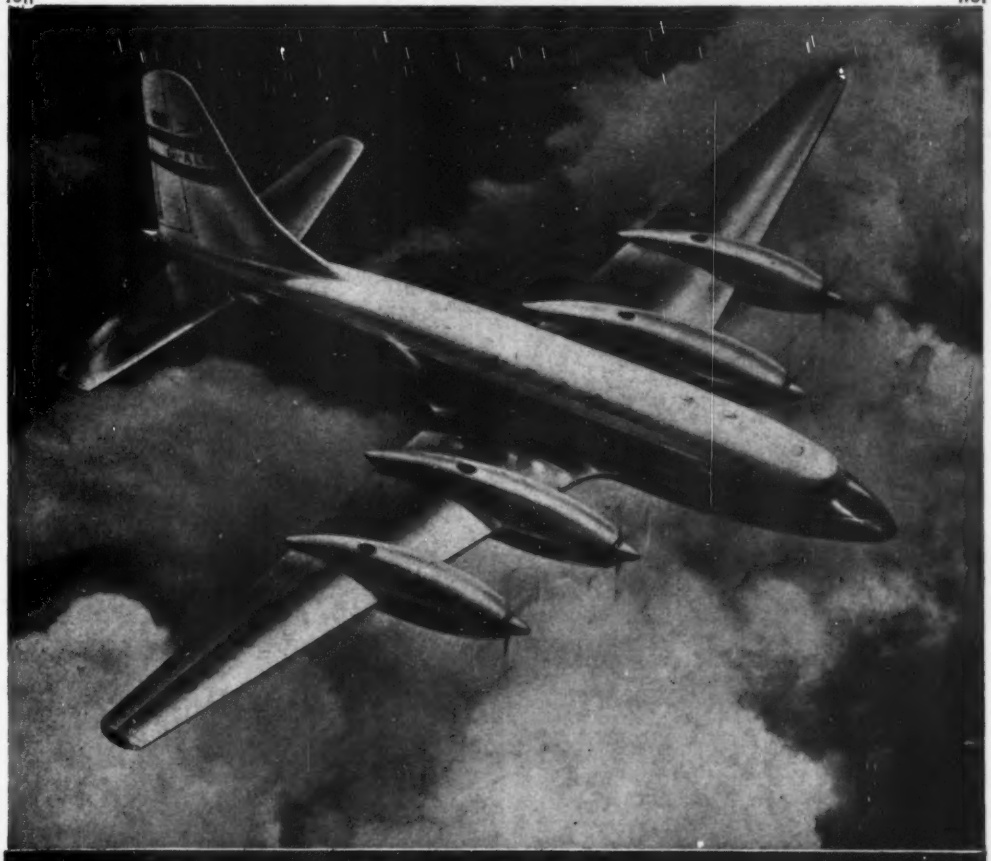

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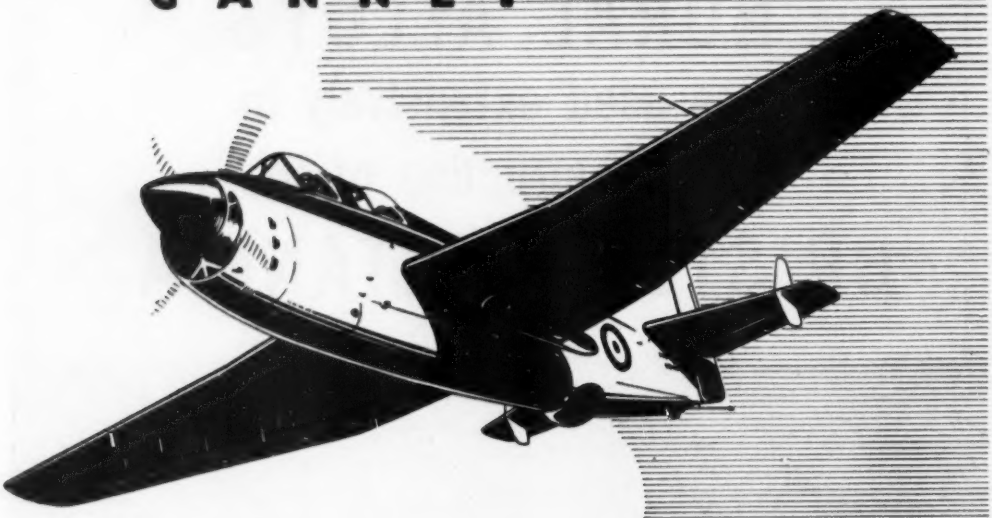

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Proud Trio

IT is a pleasant duty to record here the successful maiden flight of another outstanding British airliner, the Bristol Britannia. This event took place according to plan on the evening of Saturday last, August 16th, and the duration of the flight was thirty minutes. Twenty-five Britannias have been ordered by B.O.A.C. and the principal article on pages 209-214 of this issue is devoted to the structure of this machine. In a period of five years three "winners" among British turbine-powered commercial aircraft have been built and ordered by the airline Corporations. Subsequently both the Viscount and the Comet, the first two designs to which we refer, have also been ordered by several other operators abroad.

First of the trio to fly was the Viscount with four Dart turboprops—this was on July 16th, 1948; the Comet (four Ghost turbojets) took to the air on July 27th, 1949; and now the Britannia, with four Proteus turboprops, joins the proud parade. It is a remarkable and praiseworthy achievement on the part of the British industry that in truly difficult times and following a period of enforced neglect of commercial designs, three such advanced airliners should have flown; and not only flown, in the case of the first two, but have actually entered service or be on the point of doing so. While other countries have so far done little more than observe, B.O.A.C. has managed to put the Comet into scheduled flight on its overseas routes, and B.E.A., after a short period of trial operations, is preparing to introduce the Viscount over Europe.

Although such aircraft as these of necessity take several years to design, build, develop and produce, their manufacturers appear to have forecast well the requirements of the day. In particular, the timely introduction of the Comets has enabled B.O.A.C. alone to provide the high-speed luxury mainline services now called for by one group of international air travellers, while the Britannia gives every indication of being the ideal aircraft for modern high-capacity long-range work. It offers speed and comfort in advance of any other machine currently in use for this rapidly expanding tourist-class travel. Together the three are able to satisfy almost all the requirments of the air-travelling public, and in the future a version of the Britannia may also be able to meet the need for a British long-range pressurized freighter.

Golden Promise

It may be supposed that the Britannia's maiden flight, only made a fortnight before the S.B.A.C. Display, was not altogether a coincidence, and that this great aeronautical "manifestation" has proved a spur to the Bristol technicians, as it has to those in other factories. From these factories some vastly imposing and as yet secret machines may already have emerged, and may yet take the air in sufficient time to allow them to participate in the flying display. But even if these newcomers should be prevented from making their number at Farnborough, we are already assured of an array of top-liners, notable among them being the "super-priority six"—Valiant, Canberra, Swift, Hunter, Javelin and Gannet. It may be, moreover, that we shall see the Saunders-Roe Princess making her stately entry into public life, and certainly there will be a supersonic D.H.110, four different types of helicopter, and three super-powered Canberra flying test-beds. All these will be additional to such "side-shows" as a Sprite-assisted take-off by a Comet. In the "Static" section, the two-spool Bristol Olympus and the Napier Eland turboprop will be seen to have taken their places in the fast-filling ranks of British power-plants.

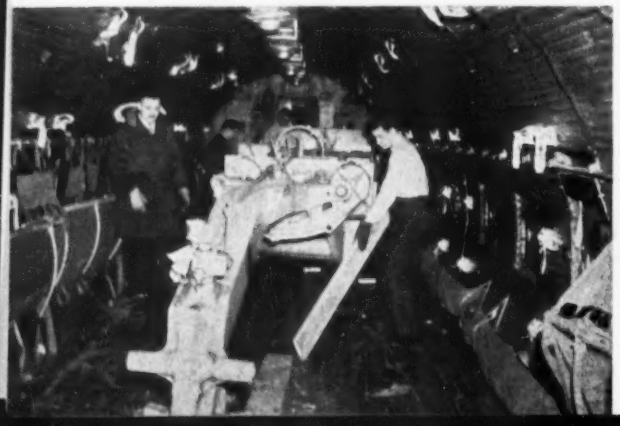
YOUR FARNBOROUGH SPECIAL

THE thirteenth S.B.A.C. Display promises to be every bit as exciting and instructive as on any occasion in the past, and once again FLIGHT intends to publish a fully illustrated review of current British aircraft power units, proprietary equipment and accessories and materials. It will constitute a guide to this great exhibition and flying display, and a work of reference for the coming months. This, our annual "Britain's Aircraft Industry" Number, will be on sale next Friday, August 29th. Readers who do not have a regular subscription are advised to order their copies at once, for the demand for this issue is always heavy. With nearly three times the usual number of editorial pages, this special issue will be priced at 1s. 6d.

Canadair North Star aircraft of R.C.A.F. Air Transport Command are to be seen in all parts of the world. This example was photographed when at Hickman Field, Honolulu. The engines are Rolls-Royce Merlins.

The destination of most men and supplies is Korea. Apparently this Canadian airman has no difficulty in communicating with natives of Hoengsong.

Canadian servicemen look none the worse for their 10,000-mile flight to Japan. (Below) This large and awkward load is the complete frame of a road-grader which was flown north from Churchill, Manitoba.



THUNDERBIRDS

Canada's No. 426 Transport Squadron has two Active Years

PERHAPS because the Pacific Ocean is still considered remote to people living in Europe, little is heard of the tremendous Allied transport operations which help to carry men and supplies to Korea by both Northern and Southern Pacific routes. In the air transport world one of the repercussions was felt last year when the secondhand prices of many types of aircraft in Europe rose in an exceptional manner as operators were tempted to part with their Dakotas and Skymasters. They went to American companies needing such aircraft for their Pacific operations or to replace on domestic services other aircraft taken for such work.

Canada has played an important part in trans-Pacific transportation, and one of the most famous of R.C.A.F. squadrons, No. 426 Transport (Thunderbirds) of Air Transport Command, recently completed a second year of successful operations on the Korean air lift. The Thunderbirds, while making Canada's main contribution in the Pacific area, have also carried out many additional transport duties at the same time. For example, they are handling a growing commitment for air transport to and from Europe in support of R.C.A.F. fighter squadrons and the Canadian Army's 27th Infantry Brigade stationed in Germany. In November last year, four-engined North Stars of 426 Squadron flew Red Cross supplies to Italy for the relief of victims of the Po Valley floods. Two machines each carried 9,700 lb of supplies from Malton Airport on the route to Italy via Gander, the Azores and Gibraltar. The captains were F/L. R. J. Brown and F/L. Gordon Stuart.

In springtime, in particular, but also on other occasions during the year, the squadron, working from Resolute Bay on Cornwallis Island, has flown hundreds of tons of mail, food and equipment to Arctic weather stations. In April this year two North Stars co-operated with four C-54s of the U.S.A.F. in such supply operations to the isolated weather stations at Mould Bay on Prince Patrick Island, Isachsen on Ellef Ringnes Island, and to Alert and Eureka, both on Ellesmere.

The Thunderbirds' overseas flights are not their only commitments, for they also take a large share of the internal transport work required by the R.C.A.F. in Canada.

Operations started on the Korea air lift on July 27th, 1950, when three of the Thunderbirds North Stars took off from McChord Air Force Base, Tacoma, Washington for Haneda Airport, situated between Tokyo and Yokohama in Japan. The early flights were all made over the Northern route via

The North Star crew of 426 Squadron receives a welcome at Isachsen, N.W.T., to which supplies have been flown. Left to right are F/O. Darwent, F/O. Kunce, F/L. Stuart, F/O. Sage and Corporal Thompson.

A welcome piece of equipment, a Herman-Nelson heater, is seen being unloaded on Ellef Ringnes Island, North West Territories. Note the mountainous terrain in the vicinity of the airstrip.

Elmendorf Field in Alaska and Shemya in the Aleutians. The distance of each return flight is about 20,000 miles. An alternative Aleutians stopping point on the Northern route is Adak, while on the mid-Pacific route via San Francisco and Hawaii stops may be made at various small islands, including Johnston, Wake and Iwo Jima. The first commanding officer was W/C. C. H. Mussells, D.S.O., D.F.C., and the squadron was normally based at Dorval before transferring to McChord.

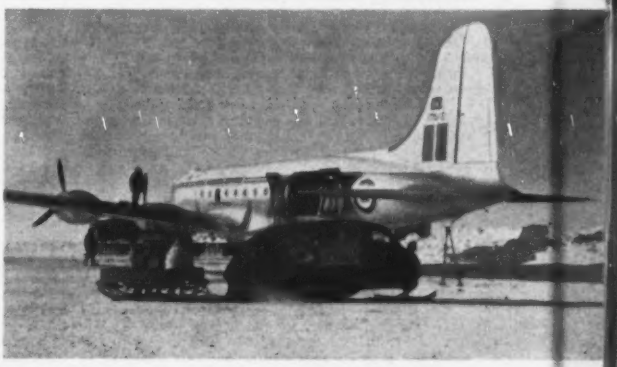
The aircraft strength was six North Stars at the start, two more were quickly added, and within a month or two the number was increased to twelve. During the period when the supply problem was most acute the squadron, using the slip-crew system, kept up a daily shuttle run, the flight from McChord taking approximately 25 hours.

After a year of operation the Thunderbirds returned to their base at Dorval owing to congestion at McChord. The move coincided with the appointment of a new commanding officer, W/C. J. K. MacDonald, D.F.C. To mark the completion of their first year of operations, during which time nearly 250 trips were made, 6,600 personnel were flown, and some 2,700,000 lb of mail and freight carried, a parade was held at Dorval during which W/C. MacDonald received a silk flag bearing the insignia of the U.S. Military Air Transport Service, under whose operational control the Thunderbirds carry out their Pacific flights. Also present on this occasion was A. Cdre. A. D. Ross, A.O.C. Air Transport Command, R.C.A.F., whose headquarters were shortly to be changed from Rockcliffe, near Ottawa, to Lachine, outside Montreal. Shortly after the move, incidentally, A. Cdre. Ross took over command of Maritime Group Headquarters and A. Cdre. R. C. Ripley, A.C.A.S., took over A.T.C. A return presentation was made by the squadron of a hand-painted copy of its famous Thunderbirds badge, to be hung at the McChord Base.

It may be mentioned that although most of the Canadian squadron's associations were with American airmen, air and ground crews also got to know other Commonwealth crews. At Tokyo, for example, maintenance staff were quartered and took their meals at Ebisu, an Australian camp of the British Commonwealth Occupation Forces.

The first Canadian Sabre fighter squadron to fly across the Atlantic was assisted and shepherded by the Thunderbirds in what was known as Operation Leapfrog One. This was No. 439, based at Uplands Air Base, Ottawa and destined for North Luffenham, near Stamford. The two other Canadian Sabre Squadrons (Nos. 410 and 441) forming No. 1 Fighter Wing were already installed at North Luffenham, but their personnel and aircraft had travelled across by H.M.C.S. *Magnificent* at the turn of the year.

No. 426 Thunderbirds carried ground crew, ground handling equipment and spares for 439, and made servicing facilities available at the various touch-down points—at Goose Bay, Greenland, Keflavik and Kinloss. As is now generally known, the operation took place successfully at the



A novel form of transport known as a snowmobile, with sleigh in tow, bears food supplies which are being flown out of Resolute Bay, Cornwallis Island, 1,700 miles north of Winnipeg.

end of May; control was in the hands of 426's previous flight commander W/C. Mussells, now with Air Transport Command. As a result of experience with the first Canadian air-moved fighter squadron, 426 Squadron are expected to play a prominent part in the succeeding movements which are planned to meet Canada's commitment of a twelve-squadron Air Division in Europe. Operation Leapfrog Two is due to take place early this autumn.

At the beginning of this month No. 426 Transport Squadron completed its second year of continuous operation on the Korean air run. It had completed more than 400 round trips, maintaining what the Canadian Defence Minister referred to as an "irreproachable record." He added that there was no finer tribute to the Squadron than to say that its personnel had "reduced a gruelling and extremely demanding task to the status of a purely routine operation."

The totals recorded by the Squadron in the Pacific area have now risen to 25,000 flying hours, 4,300,000 statute miles covered, 5,000,000 lb of freight and mail carried, and more than 10,000 passengers, including wounded returning from the Far East. Recently the Squadron has again reverted to the Northern Pacific route. Shortly before the Squadron's second anniversary W/C. H. W. Lupton took over command from W/C. MacDonald, who has now assumed duties with the R.C.A.F. Air Division on the Continent.

In recognition of the work done by 426 Squadron the Queen's Birthday Honours List included the names of 14 Thunderbird officers and men. The awards included the O.B.E. for W/C. Mussells, the M.B.E. for W/C. Lord, and A.F.C.s for W/C. Morrison, S/L. Dickson and F/L. Payne.

SUPERSONIC STALKER. The second prototype of the Avon-powered D.H.110 night-and-all-weather fighter. It may now be disclosed that on April 9th the first prototype achieved supersonic speed and that it has frequently repeated this performance. The pilot on these occasions has been Mr. John Derry, who was the first pilot to exceed Mach 1 in a British aircraft, namely the experimental D.H.108. A two-seater, the D.H.110 has a span of 51ft and a length of 52ft.

FROM ALL QUARTERS

Britannia Takes the Air

AT 5.12 p.m. on Saturday, August 16th, the Bristol 175 Britannia took off on its eagerly awaited first flight; now begins an extensive programme of flight testing to pave the way for the introduction of this outstanding airliner on B.O.A.C. routes in some two years' time. The take-off is illustrated on page 221.

The flight, which lasted thirty minutes, was in the efficient hands of Mr. A. J. Pegg, the chief pilot of the Bristol Aeroplane Company. After take-off, which required only 600 yd of the long "Brabazon" runway at Filton, the Britannia "turned to port for a wide sweep over Gloucestershire and South Wales." A faultless landing was preceded by three wide circuits round the airfield at 4,000ft. During preliminary taxi-ing runs, as in actual flight, the Britannia behaved perfectly, and its nosewheel had been seen to lift at only 50 kt during the final run.

On landing, "Bill" Pegg made a characteristically brief but encouraging statement: "It was a completely satisfactory first flight and the aircraft handled well." His flight-test crew consisted of two engineers, two observers and an electrical engineer.

Some brief biographical notes on the Britannia's first crew may be set down here for the record: Mr. Pegg, who has flown over 5,000 hr in more than 150 different types, joined Bristols as a test pilot in 1935, becoming chief test pilot in 1947. He entered the R.A.F. as an apprentice in 1921 and began his training as an N.C.O. pilot in 1925. After serving as an instructor at C.F.S. he was granted a permanent commission and posted to Martlesham as a test pilot. He first came into the public eye in September, 1949, as the pilot of the Mark I Brabazon prototype.

Mr. L. D. Atkinson (flight-engineer) joined the B.A.C. in 1937 and has served for two years at Farnborough as the company's resident technician. He has considerable experience of flying as a test observer during engine development programmes. The other flight-engineer, Mr. Charles Harding, has flown some 500 hr in Blenheims, Beauforts, Beaufighters, Lancasters and Halifaxes.

Mr. M. W. West, the chief flight-test observer, is an ex-flight lieutenant who has logged nearly 1,000 hr on test duties. Mr. G. Taylor, also a flight-test observer, is a graduate of Leeds University; he has flown 350 hr on test duties, mostly in the Brabazon. Like Messrs. Pegg, Atkinson and West, Mr. K. A. Fitzgerald (electrical engineer) was a member of the Brabazon's maiden flight crew, and he has flown in the 130-ton prototype on most of its subsequent tests.

Sir Miles Thomas, chairman of B.O.A.C., which has ordered 25 Britannias for service on long and medium routes, sent a message of congratulations to the management and staff of the Bristol Aeroplane Company. Describing the flight as another milestone in British aviation, Sir Miles said that the Britannia was complementary to the Comet in the development of an ordered and balanced overseas route-pattern. Both aircraft, he said, incorporated advanced principles of gas-turbine design which give Britain a four years' lead. The Minister of Supply, Mr. Duncan Sandys, sent the following telegram to Sir G. Stanley White, managing director of the company: "I was very glad to hear of the first flight of the Britannia. Please convey my warmest congratulations to all who took part in this great development."

With a span of 140ft and a gross weight of 140,000 lb, the Britannia is the largest aircraft yet ordered for service with a British airline. Four Bristol Proteus 3 turboprops, each rated at 3,780 e.h.p., will confer a cruising speed of some 360 m.p.h. at a mean altitude of 30,000ft.

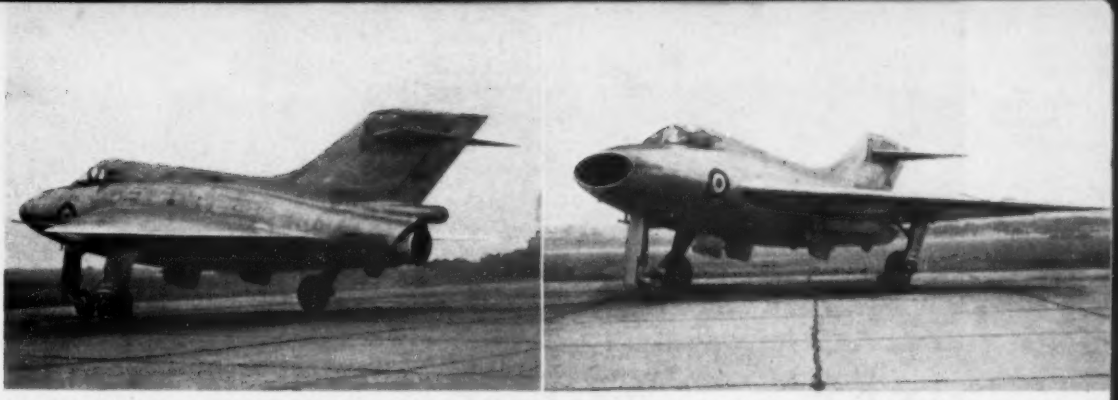
The news of the Britannia's first flight coincides with the publication of the comprehensive design-analysis of the aircraft (illustrated with a special sectioned drawing) which will be found on pages 209-214 of this issue of *Flight*.

The crew for the Britannia's maiden flight: (left to right) A. J. Pegg (pilot), L. D. Atkinson (flight-engineer), G. Taylor (flight-test observer), Charles Harding (flight-engineer), M. W. West (chief flight-test observer), K. A. Fitzgerald (electrical engineer). The take-off is illustrated on page 221.

One More for Hayhow

INSTEAD of adding three more capital-to-capital records last week-end to his now-bulging bag, Tom Hayhow acquired only one. Saturday's weather, with strong head-winds, was primarily to blame. He took off from Denham at 0544 hr 17.6 sec (R.Ae.C. observation!) in his much-travelled Auster Aiglet *Liege Lady* with Madrid (790 miles) as his goal.

His flight-plan envisaged a refuelling stop at Jersey, but as he neared the island he judged that he had sufficient fuel in hand, and decided to carry on. The head-winds, however, increased, and when—owing to an inadequate map—he lost his way somewhere south of Madrid, he found that his 64 gallons were almost exhausted, while oil



B.P.'s NEW DELTA: Now undergoing flight trials in the hands of the makers' chief test pilot, A. E. ("Benn") Gunn, the Boulton Paul P.120, here depicted, follows the general lines of the P.111, demonstrated at the S.B.A.C. display last year. The new machine, which is expected to make its first public appearance at the S.B.A.C. Display, has been built for aerodynamic research at "near-sonic" speeds, and differs from the P.111 in being fitted with a tailplane adjustable for trim. The shape of the fin and rudder assembly has also been modified, but the power-plant is still a Rolls-Royce Nene. The span is 33ft 5½in, and the length 29ft 7½in.

shortage was causing his engine temperature to rise ominously.

He accordingly put down, and quite successfully, on a cart-track, only to find that there was no fuel or oil in the district. Spurning Spanish hospitality in the shape of a glass of wine and two raw eggs, he took off again, and eventually made another road landing, this time near Cuidad Real, 100 miles south of Madrid. He here obtained seven bucketsful of low-grade fuel, and strained it through a handkerchief. He then carried on to Madrid, landing at Cuatro Vientos at about 1630 hr B.S.T.

As the stops had brought the Aiglet's average speed well below the qualifying 100 m.p.h. minimum, no London-Madrid record had been established; the out-and-home record, likewise, was now impossible of achievement. There was, however, nothing to prevent the irrepressible Hayhow trying for a Madrid-London record next day, Sunday. He accordingly took off at about 0714 hr B.S.T.—the R.Ae.C. was still awaiting the exact time when this account closed for press—and, after an uneventful journey (though the Aiglet was forced by cloud to over 11,000ft in the area of the Pyrenees) he reached Denham at 1406 hr 43.8 sec. If, as expected, the take-off data from Madrid results in a speed of about 115 m.p.h., the flight will, subject to confirmation, rank for record.

Tom Hayhow—who, incidentally, is 46 years of age—now holds 23 confirmed point-to-point records. When his three Stockholm records of the previous week-end are homologated, plus the Madrid-London flight, he will have no fewer than 27 to his credit.

Launching the Princess

AS we close for press it is learned that strong north-easterly winds, gusting to over 30 knots, had delayed the launching ceremony of the Saunders-Roe Princess, due to take place at 10.30 a.m. last Tuesday, although the aircraft had been positioned with the water lapping her keel. Should the wind abate, the mid-night tide would provide the next opportunity—early on Wednes-day morning.

It was expected that taxying trials would begin some 24 hours after the launching, but Mr. Geoffrey Tyson stated that he would not taxi until the weather was also suitable for flying. Three motor-boats were to sweep the flight-way ahead of him, and it was expected that a run of only 1,000 yards would be needed for the take-off.

As she sat at the lower extremity of the slipway at Cowes, the Princess weighed 218,000 lb. Once afloat she was to take on 6,200 gallons of fuel, bringing the weight up to 260,000 lb for her maiden flight. Her total fuel capacity is 14,500 gallons. A crew of twelve was to take part in the first flight. Until 7.30 a.m. last Tuesday final engine-runs continued and, according to local reports, the noise was terrific; but once the flying-boat is afloat away from the sound-reflecting buildings and large hangar doors it is unlikely that the sound will give cause for complaint.

Ambassadors Travel Appropriately

AT the invitation of the Lord Provost of Edinburgh, ambas-sadors and senior representatives of some twenty countries last Sunday flew to the Scottish capital for the opening of the Edinburgh Festival. Most appropriately these representatives, some of whom were accompanied by their wives, travelled as the guests of B.E.A. in an Elizabethan (Ambassador) airliner.

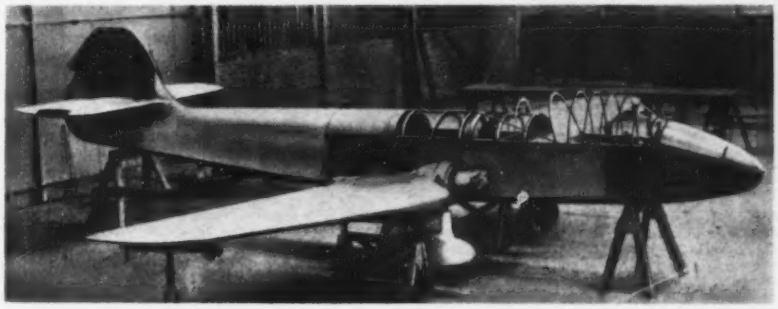
The B.E.A. Elizabethan was paying its first visit to Scotland, and on the return flight operated a normal scheduled service to London *via* Glasgow.

High-Level Comets

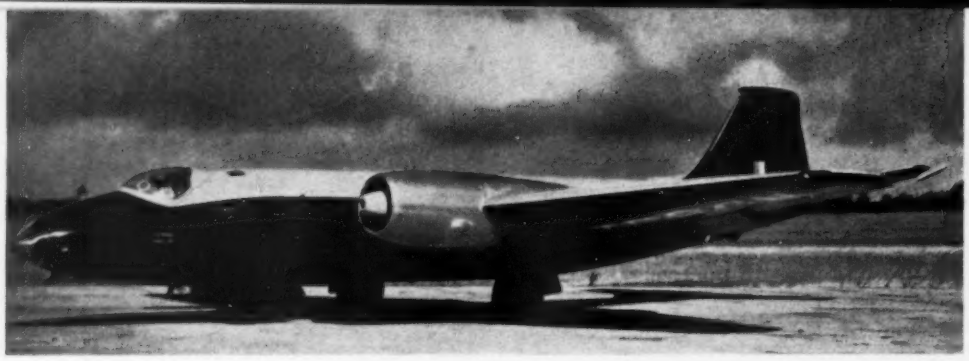
SEVERAL more distinguished personalities have recently experienced jet travel in B.O.A.C. Comets. When two demon-stration flights were made over Malaya on Monday, each lasting 20 minutes, the 72 passengers included Mr. J. F. Nicoll, Governor of Singapore. Then, on Wednesday, Mr. Pandit Nehru, Indian Prime Minister, was due to make a 90-minute Comet flight, accompanied by his family and members of his Cabinet. Mr. Clement Attlee and his wife were among the passengers on the regular Comet service from London to Johannesburg on Sunday afternoon; their destination was Livingstone, Northern Rhodesia.

The R.A.F. at Ypenburg

THE point was made in one leading article last week that British participation in the recent ILSY display at Ypenburg was on a disappointingly small scale. Special credit, therefore, goes to the six Vampire pilots from B.A.F.O. who put up such a fine show of formation aerobatics. They were S/L. Hardy, F/L. Smart and Sgt. Jackson of No. 71 Squadron (red flight), and F/O. Blake, F/O. Arnott and Sgt. Lamb of No. 3 Squadron (blue flight). Our report, however, reproduced a mistaken reference in the official programme which gave all the credit for the performance to No. 71 Squadron; knowing how very real is the R.A.F. squadron spirit, we are happy to correct this false impression.



SPARROWJET: To our French contemporary, "Aviation Magazine" we are indebted for this preview of the Miles Sparrowjet, shown under construction at Shoreham. A joint Miles-Dunkerley project, and powered by two Turboméca Palas turbojets, it will fly later this year and will be raced by the redoubtable Dunkerley next season. The airframe was origin-ally that of Sparrowhawk G-ADNL.



HERE AND THERE

OLYMPUS - CANBERRA: First views of the English Electric Canberra adapted for the flight-testing of the Bristol Olympus turbojet. Prior to its appearance at the S.B.A.C. Farnborough Show the Canberra is being test-flown by Walter Gibb, who reports that engine performance is "most satisfactory."

Netherlands Naval Visitors

A SQUADRON of Dutch Navy Sea Furies is due here early next month for pilot-training from R.N. air stations and carriers.

Dominion Gift

INCLUDED in the $150 million (£53,570,000) armament gift offered by the Canadian Government to Britain are 350 F-86 airframes. Apart from the gift, Canada is placing defence orders to the value of £35½ million in Britain during the coming year.

Sweet and High

PASSENGERS leaving London Airport and Northolt are now allowed to buy sweets—price limit, £1 per box—without coupons. There is only one stipulation: that they must take the sweets with them and not hand them over to anyone who is not also leaving in the aircraft.

A Day for Modellers

NEXT Sunday, August 24th, aircraft-model enthusiasts are likely to flock in their thousands to the Handley Page airfield at Radlett, where the seventh All-Herts Model Aircraft Rally is to be held by St. Albans Model Aero Club. Admission is by programme, obtainable at the gates at 1s, or at 9d in advance from J. J. Greening, 25, Mandeville Drive, St. Albans, Herts.

New Trunk Route

R.A.F. fighter-bomber attacks on Communist positions in Malaya have caused wild elephants to leave the jungle and enter cultivated areas in which they have never before appeared.

Competitive Recognition

THE Aircraft Recognition Society, now in its tenth year, opens its 1952-53 season on September 17th, with a lecture and contests at the R.Ae.S. Library. The hon. secretary is Mr. Gerald J. Pollinger, 39-40 Bedford Street, Strand, London, W.C.2.

Old Soldier

TO be published in October is a biography of W/C. "Sos" Cohen, who, as an air gunner in World War II, won the D.F.C. at the age of 69. He fought in four campaigns: the first was the Matabele War of 1893. Author of the book is Anthony Richardson, who wrote *Wingless Victory*, the story of Air Marshal Sir Basil Embry's escape from France.

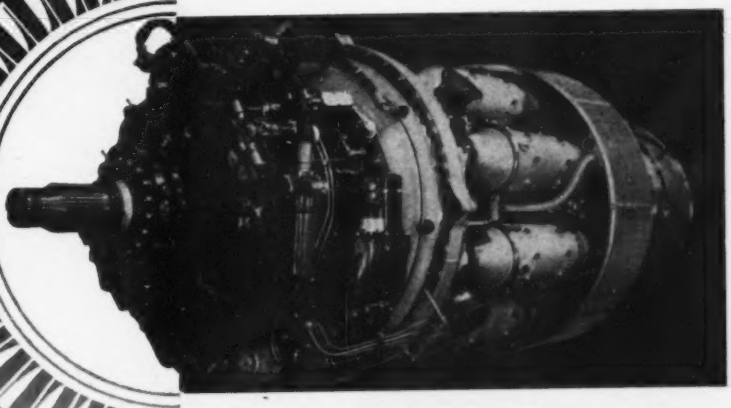
Jot it Down!

ONCE again we repeat details of Farnborough Show dates and prices: From September 1st to 4th (the Monday to the Thursday) admission is restricted; the public days are the 5th, 6th and 7th—the Friday, Saturday and Sunday. On the Friday, 10s (children under 16, 5s) will be the admission charge; cars, with occupants up to their normal capacity, will be charged at £3 (or—for those booking in advance—at a parking fee of 10s, with individual passenger charges at the 10s and 5s figure quoted). On the two remaining days, the prices will be 5s (children 2s 6d), and for cars with occupants, £1 10s. Further details—including those of charges for motor coaches, motor cycles and cycles—are obtainable from the advance-booking agents, Auto-Parks, Ltd., 1 Maclise Road, London W.14 (Shepherds Bush 5385). The special number of *Flight* next week will include Farnborough public-enclosure and travel information.

PART FOR A "HEAVY": Fighter pilots and test pilots having had their share in recent British flying films ("Angels One Five" and "The Sound Barrier") it is now the turn of Bomber Command. R.A.F. Station Upwood was recently put at the disposal of Mayflower Pictures for the location-shooting of a picture called "Appointment in London," and three Lancasters—one of which, suitably shot-up, is seen above, forming a background to the usual crew of technicians—were collected for the occasion. We have seen something of the production and so far it looks promising.

Jessop

TURBINE DISCS ARE USED IN THE "Bristol" PROTEUS 705



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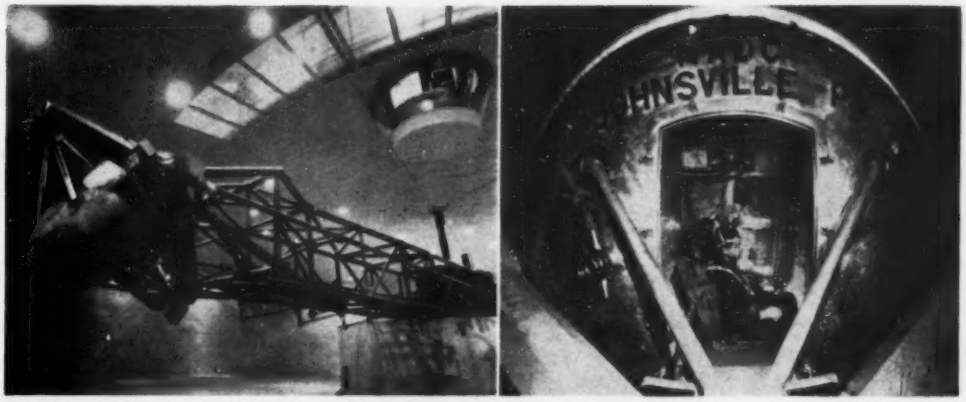


FUN FAIR: This vast and elaborate "centrifuge" has been installed at the U.S.N. Aviation Medical Laboratory, Johnsville, Pa., for the study of g effects on jet-fighter pilots. The subject of a test (seen in the picture on the right) can be accelerated from a standstill to 174 m.p.h. in less than 6.9 sec, and in any attitude. The photographs come from the Elastic Stop Nut Corporation of America, whose vibration-proof nuts are extensively used in the highly stressed structure.

HERE AND THERE . . .

Anniversary Drop

PARACHUTIST Gwynne Johns, of Bournemouth, who in 1938 gained an unofficial world record for a delayed parachute drop at night, recently celebrated the 20th anniversary of his first jump by making his 69th at Christchurch, Hants. He took up parachute jumping to pay for flying lessons in 1932 and was a familiar figure at pre-war air shows.

Another Swedish Protest

THE Swedish Foreign Minister has delivered a new note to the Russian Ambassador concerning the incident over the Baltic in June. It maintains that there is "fully binding evidence" that the unarmed Swedish Catalina was shot down by Russian fighters and that there is good reason to believe that the DC-3 radio trainer, which was also lost over international waters, was fired upon by Soviet aircraft. The Swedish Government also "regrets that the Soviet refuses to submit this legal dispute to impartial examination by international forum." The picture below forms an interesting commentary on this news.

Hot News

UNUSUAL enterprise has been shown by the Indian newspaper, *The Statesman*, which is published simultaneously in Calcutta and Delhi. A copy dated August 13th contained the report of the previous day's inauguration of the first Comet service to the East, and carried inside a well-prepared four-page supplement on the flight, the Comet, its Ghost turbojets and the men responsible for the aircraft. Copies were forwarded in a specially printed wrapper on the return service of the Comet so as to be on the desk of London readers within 24 hours.

IN BRIEF

THE British Standards Institution has issued a revised edition of B.S.899, "Rolled Copper Sheet and Strip for General Purposes." Copies are obtainable, price 2s 6d, from the B.S.I. Sales Department at 24, Victoria Street, London, S.W.1.

* * *

Modern Industrial Finishes, Ltd., Thames Chemical Works, Northfleet, Kent, state that they have now obtained M.o.S. approval (D.T.D. 900/4253) for their "Sorco" aircraft-painting scheme, resistant to ester lubricants.

* * *

Readers visiting the 19th National Radio and Television Exhibition (Earls Court, London, August 27th-September 6th) may like to note that a special issue of *Wireless World* (dated September, but on sale August 26th) will provide a detailed guide to the show.

* * *

The recent "war" against the locust plague in Iraq, conducted by ground attack and also by two Piper Cubs provided by the U.S. Government, has been characterized by "100 per cent success." The insecticide used for aerial spraying was Aldrin, a petroleum derivative of which Shell has sole manufacturing rights.

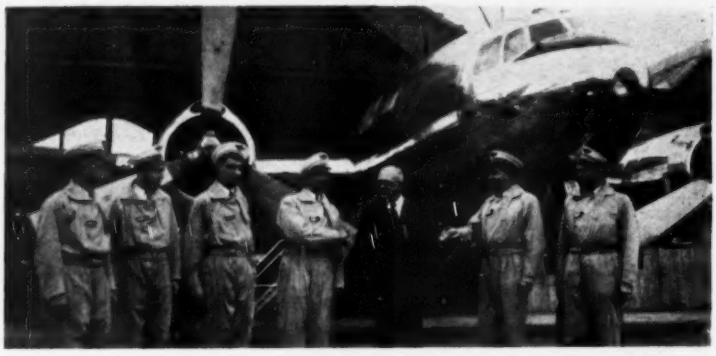
* * *

The College of Aeronautical and Automobile Engineering, Chelsea, announces that its Mollison Challenge Trophy (for general efficiency in aeronautical engineering) has been won for 1952 by D. J. Fermo, while the Olley Challenge Trophy (for practical ability) goes to D. R. Hilary. Four Chelsea students (H. A. Bucholdt, R. S. Dobbs, D. Drane and D. Wood) were successful in the recent R.Ae.S. examination.

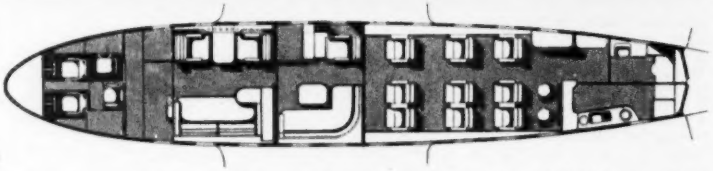
ARROGANCE ADVERTISED: The American State Department has made public this Russian poster depicting Russian Mig-15s chasing U.S. aircraft. The U.S. Government protested when it was displayed in Moscow on Aviation Day. The headline translation is: "Glory to Stalin's eagles, standing on guard for the peace and security of our motherland."

PRESIDENTIAL TRANSPORT

An S.O.30 for M. Auriol

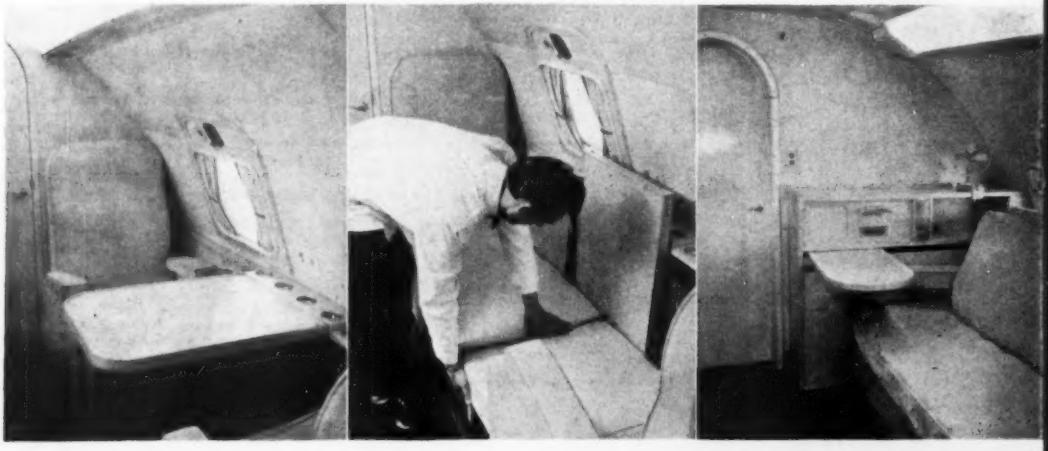


Exterior, interior and plan views of the V.I.P. Bretagne are shown on this page. On the right, M. Auriol is seen with his crew—shaking hands with Col. Cressaty and Capt. Canteraine (left). Other crew members are Capt. Guenare, Adjt.-chef Delacour and Adjts. Maguies and Martineau.



AT a recent ceremony at the SNCASO works, Villacoublay, the President of the French Republic, M. Vincent Auriol, was presented with an S.O. 30 Bretagne aircraft christened *France*. The machine is specially fitted out to meet the requirements of a president, both as a personal transport and for the reception of "high-ranking foreign personalities visiting France." The presentation was made by the Secretary of State for Air, M. Pierre Montel, in the presence of M. G. Glasser, president and general manager of SNCASO. M. Auriol had expressed the wish that it should be a small private ceremony, and the only other people present were engineers concerned with the construction of the aircraft, and Lt.-Col. Cressaty, the President's air attaché, who introduced members of the crew and conducted the President on his inspection of the aircraft. M. Auriol said that the aircraft bore the label of French technical skill and taste.

The President's Bretagne is equipped with extra tanks to give it a range of some 1,400 miles and the cabin is laid out to take up to 15 passengers. The external colour scheme consists of two blue stripes along the fuselage, a wings-and-star insignia on the nose, with the name *France*, and the tricolour on the rudder. The tasteful interior includes garnet-red carpeting of the three main compartments, wall and ceiling covers of light yellow gaberdine, and fittings in sycamore. A cabin instrument panel indicates speed, heading, altitude, and outside and interior temperatures. The styling is the work of MM. A. Mauny and S. A. Deport. The two engines are 2,435 h.p. Pratt and Whitney C.A.18s.



"Flight" photograph

". . . the slipstream is directed straight to his face, thence to curl round the back of his neck, and seep through the cracks in his flying suit . . . At all costs he must never be allowed to grow up into a limp and pampered pilot."

PASSING of the TIGER

An R.A.F. Pilot's Libellous but Affectionate Farewell

IT is one of the characteristics of the Anglo-Saxon that he never ceases to take a delight in his own follies and absurdities. When the nature of them is explained to him by members of a more cynical race, he is always found to be ready to listen to a recital of his faults with a courteous ear; but for preference he likes to be told of them by another of his kind, because only then can he be sure that the joke is with him, and not against him. For it is his devout belief that his failings make him the salt of the Earth, and he likes people to appreciate the fact.

Among the articles of faith in his own inspired madness is a belief in the beneficial properties of self-inflicted misery. He has been told, sometime in the remote past, that "we surely emerge finer and stronger for our suffering"; and has long ago absorbed this maxim into his system, so that it has become more instinct than reason. As he walks down the alley of life the mental hoardings of his subconscious mind shout at him continually "More Agony Now Means Better Rewards Later"; so he stiffens his upper lip and prepares for his ordeal. He gets up at an unreasonably early hour of the morning to run round a muddy track in drizzling rain, clad only in vest and shorts, merely to wake up his circulation; he learns to play the piano by thumping up and down scales instead of picking out his favourite tune; he spends many years filing bits of metal in the pretence that his labour is going to make him a better engineer; he pours the nastiest products of the chemical factories into his stomach in the belief that they do him more good than food; and he learns to fly in a Tiger Moth.

This philosophy (which appears to have been the guiding force in the establishment of the majority of our educational institutions) has found a strong place in the system of flying training. Although—as we shall see later on—a subtle change in the latter is in process of taking place, the Anglo-Saxon's strong attachment to tradition has provided a precedent for the continuation of his methods. This precedent is further strengthened by the latent antagonism between the generations. The elders, despised by their juniors for their age and habits, are determined to get their own back. If the youthful tyro to the system of educational fatigues complains that what he is enduring seems unnecessary for the aim in mind, he is at once assured by his mentors that it is a mere nothing compared with what they had to go through; and his punishment is straightaway doubled.

The popular manuals of flying training imply to the prospective aviator that, for success in his career, he must possess not only the capacity of the scientist for abstruse mathematical calculations, but also the daring individuality of the Border Scout, combined with the rigid *esprit de corps* of the crack cavalryman. But this formidable set of requirements leaves out completely the one essential qualification—the quality of masochism, the eagerness to endure mortifications, "just for the sheer hell of it." And so it is that the recruit who has set his mind on fighting his way through the storm-rent passes of flying training to the smiling meadows of qualified aviation beyond must be given a warning. He should know that he is liable, from the moment he sets foot in the cockpit of his trainer, to be faced with one of the most ingenious combinations of man and machine ever designed to try the spirit of youth. If he does not show himself willing to endure suffering for suffering's sake, then he had much better stick to the safe, if irksome, security of his office stool.

The instructors who write the flying manuals, who know the real requirements of the trainee, stress, with a considerable niceness of hypocrisy, that the pupil should be made as comfortable as possible—"within reason," they say, disguising their evil intentions with a show of innocence. Thus it is that the initiate, cheered by this vision of luxury to come, is prepared to dismiss the fact that the flying suit (constructed of thick tarpaulin-like material) into which he is struggling is either so small that it leaves him feeling like a fowl trussed up for roasting, or else is so large that it sags in an ungainly manner onto the ground. As he walks out for the first time to his aircraft, parachute buckled on and swinging gallantly behind (just as in the American films), his brain will be so suffused with heroic thoughts that he will not realize that the pack is chafing the backs of his knees. He will not see or realize anything, and is thus in a suitably receptive state for the machinations of his instructor—the same instructor who has just now smiled at him, and shaken hands with him, to show that the game is to be played to rules. When he finds himself lashed tightly in the cockpit, with the twisted buckle of his flying suit boring painfully into his back, he may begin to have some slight twinges of doubt, but probably he consoles himself with the Leibnitzian reflection that everything must be for the best in this best of all possible worlds. The elaborate purgatory which effects the transformation of an earthling to an aeroplane pilot is now under way.

The graduate of a course of tribulations, the start of which is as above, will probably have noticed that the Tiger Moths lying in the last state of decrepitude on the flying fields have given place almost entirely to gleaming rows of sleek and silver monoplanes, complete with cabin covers and heating systems, radio sets, windscreen wipers, adjustable seats, and all the other comforts of modern civilization. He must, therefore, be forgiven for wondering if some new and shameful spirit of decadence has managed to infiltrate into aviation circles. Surely our forefathers, who had to reach out and twist the ailerons in order to turn, and had to judge the air speed from a crude device on the wing strut, would never approve of the pupil being kept snug and warm in the front cockpit, with a magnificent view all round, while the instructor crouches behind in impotent obscurity? It is certain they would not! Better by far to sit the pupil in the back seat of a Tiger Moth, and arrange the windscreen cunningly so that the slipstream is

PASSING OF THE TIGER . . .

directed straight to his face, thence to curl round the back of his neck, and seep through the cracks in his flying suit, freezing him into a mass of slow-witted reluctance. At all costs he must never be allowed to grow up into a limp and pampered pilot!

But indeed we may rest assured that it is not for some misguided humanitarian reason that the Tiger is on the way out. The plain truth is that it is becoming impossible to fly the Tiger Moth at all, except during prolonged fair weather conditions, and then only in the immediate vicinity of the airfield. Such is now the social standing conferred on aircraft according to the number of radio aids in their prossession, that biplanes without even one V.H.F. set have become very much the poor relations of the air. The snubs are now too open for comfort. It is unfortunate that the inadequacies of ageing craft do not become amusing until one is no longer dependent on them.

But there is another, greater, and more relevant reason—as hinted earlier. The process of making an aircrew member has of necessity, with increasing applied technical knowledge, been refined somewhat, and now tends to concentrate as much on the mental as on the purely physical element. It should be realized that even if our flying classrooms were to be equipped with armchairs and Coca-Cola machines, the purpose of these luxuries would be only to allow the pupils to be rested and revived periodically, in order that they might be given longer and harder doses of instructional material to assimilate. Again, the older type of instructor who relied for his effect on his superior physique is being replaced by a new variety trained in the psychological art of mental subjugation: instead of the pupil being made to feel only his physical inferiority, he is now being allowed sufficient leisure to enable him to appreciate also his intellectual inferiority. The passing of the Tiger is thus rather more than just the demise of an old aeroplane: it is the end of an era; the mark of a change from brute savagery to a more intimate form of cruelty.

It is appropriate, therefore, at this point, to step aside for an instant from the mêlée of electronics and paraffin cans, and think awhile of the days, now fast receding, when men were men and flying was flying. If the memory is too much for us, we may be permitted a few tears, even though they be crocodile tears.

The Tiger will be missed chiefly, of course, by the old air dogs, those tough, nerveless instructors who were so much a part of their aircraft that they positively preferred to impart their instructional patter while hanging upside down in the straps. One could not but admire their ability, developed through long years of practice, to roll the Tiger about a very small dot on the horizon; but for the novice the slow roll was the grimmest trial of the lot. Mental preparation was useless, for by reading up beforehand the mechanics of the roll (outlined in half a page of close print detailing the succession of stick, rudder, and throttle movements), the pupil was apt to be conditioned in a mood of despair before even attempting the manœuvre. The time for doing aerobatics was, by the way, usually chosen by the instructor to be in that part of the day when the morale and metabolic rate of the pupil was at its lowest; that is to say, immediately after breakfast, or after a long day's flying. It must be admitted that the condition of the pupil after five hours of bumpy flying was such as to excite compassion. His nerves, jarred by the incessant vibration, had gone completely numb. His brain was dulled by the scream of the wind about his head; and in his ears there was the high singing note left by the roaring of the engine. He was now entitled to a little quiet and relaxation. At this point the kindly instructor (who possessed a cast-iron stomach) would gently insinuate himself into the consciousness of the pupil, and quietly suggest an hour's aerobatics before tea. He would ask his pupil what he was looking so glum about: "Don't you *like* aerobatics?" The pupil would choke back an oath, and restrain himself from yelling at his tormentor that the mere thought of them filled him with such a fierce loathing that to give proper expression to his feelings would entail resort to a use of language rivalling the most vitriolic excesses of an eighteenth-century pamphleteer. Instead, he would meekly crawl out to the Moth again. The system had him in thrall. In this connection we might mention the French poet whose habit it was to sit all day among the rocks on the Atlantic coast, breathing the salt winds and spray, and thus getting into a suitably bemused state for the better composition of obscure poetry in the evening. This was before the days of flying. If he had lived today, he could have acquired his condition of mind with ease and with much saving of time by half an hour's aerobatics in a Tiger Moth.

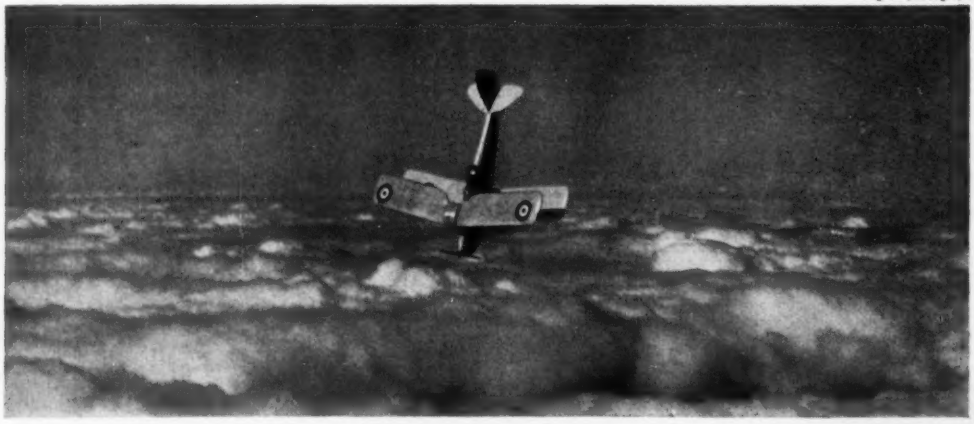
The chances which were given to the pupils to ameliorate their lot were few, but keenly grasped. Some tried to derive a little comfort by writing "D.H.82a" in their log-books, instead of "Tiger Moth," in the hope that people would think that the D.H.82a was the latest jet. Others, mindful of those yet to come, tried to ease their thorny path. Many is the time that the sweating occupant of the hood-covered rear cockpit, vainly chasing the recalcitrant instruments, must have heaved a sigh of thankfulness for the presence of the little hole in the side of the hood, worn gradually wider by generations of troubled hands; the narrow glimpse of the horizon through this aperture maintaining the one note of sanity in the whole lunatic set-up. It is well-known that the cameraderie of the air is strong. Nowhere has it been so strong as among the pupils trained on Tiger Moths. They were united in oppression, and strong with the bonds of mutual sympathy and aid.

Unfortunately for the pupil, by himself he was defenceless. His body and mind palpitated under the malevolent watchfulness of his instructor. In the days before he was allowed to take a Tiger up alone, the writer had an instructor who, now and then, used to duck down below the front cockpit level, out of sight, in order to accustom his pupil to the responsibility of being in sole charge of the aircraft. He need not have worried. With or without the physical proximity of the instructor, there was always for the writer that presence lurking in the front cockpit, patiently waiting for a chance to pounce on the pupil should he be foolish enough to allow the top needle to depart for one instant from dead centre. The pupil was there on sufferance only. Sometimes, if he muffed a manœuvre when flying solo, he would involuntarily glance ruefully to the front, and imagine in the mirror the wrathful look in the eyes of the instructor.

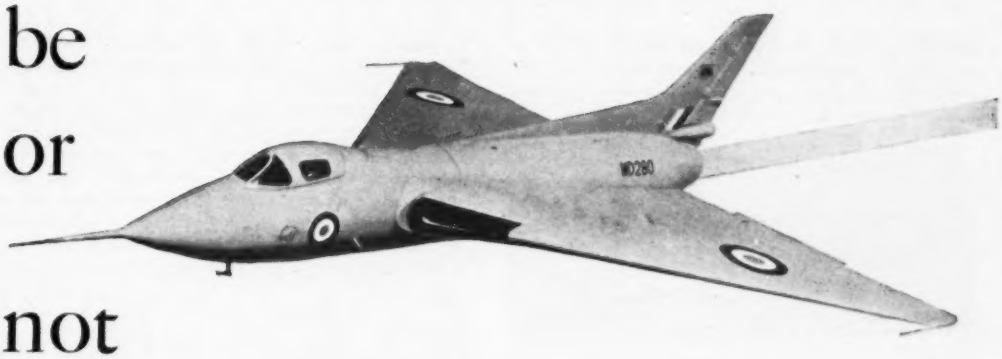
But the reader must not be given the impression that the writer was unhappy at flying school. He is an Anglo-Saxon himself,

"The time for doing aerobatics was, by the way, usually chosen by the instructor to be in that part of the day when the morale and metabolic rate of the pupil was at its lowest; that is to say, immediately after breakfast, or after a long day's flying."

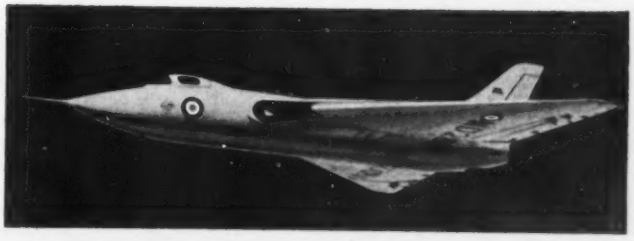
"Flight" photograph



To be or not to be a *Delta?*



There really isn't any question about it now . . . the day of the Delta Wing Aircraft has come! For this above all is true . . . that the Delta gives faster speed, longer range, higher ceiling and bigger payloads for less fuel expenditure than any other planform, handling smoothly and easily throughout the speed range.



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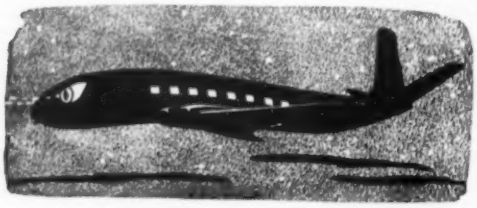
Nimble Gimbals

BY BERNARD HOLLOWOOD

THE control panel of the modern aircraft is not so much a panel these days as a mural or fresco. The night has a thousand eyes, and so have the Comet and birds of that ilk.



Now I find it difficult enough to glance simultaneously at the seven dials on the dashboard of my faithless roadster (four shillings and how much is it a gallon?) and it surprises me therefore to learn that aircraft pilots manage their multiplicity of meters quite easily.

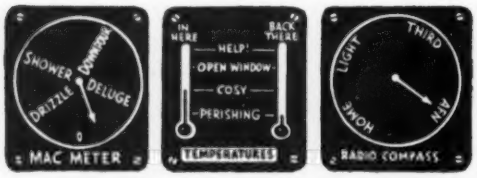
I asked one of them how it is done—a tall cool devil, he was, with a heavy black moustache but without any additional evidence of stubble trouble.

"Oh, it's just practice," he said, turning to the co-pilot and half-closing one eye. "Soon get used to it, don't we, old son?"

"That's right," said old son, lowering his right eyelid to half-mast, "you *need* plenty to read on a long journey."

Would they please tell me something about the instruments? Certainly. A pleasure. And in strange aeronautesque jargon they began to put me in the picture. Well—sort of.

"That's the 'metronome,' they said, pointing, "and that's the 'egg-timer,' and that's the 'lie-dector,' and that's the 'frame-hold' and that's . . ."

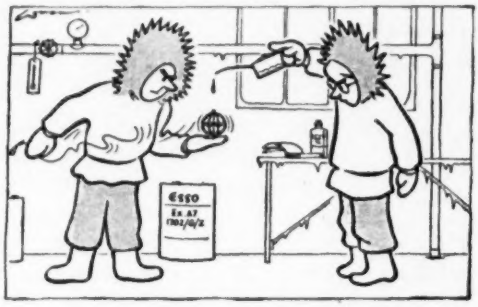


I had to laugh.

Later, over the cup that cheers, they told me all about the nimble gimbal, and this time their faces were perfectly serious and full of club sandwich.

It seems that modern aircraft are equipped with certain instruments that enable them to fly blind—with mechanical eyes that can pierce eight-eighths cloud, pea-soup or London Particular fog and Stygian black-out. Even where there are no signposts a pilot can exhibit an excellent sense of direction and a good head for heights provided that his cabin is furnished with the necessary wall-charts.

Now most of these instruments operate gyroscopically, and the gyroscopes are usually driven either pneumatically or electrically at very high speeds, and they must attain their operating speed in double-quick time, and they must continue to "free-wheel," as it were, for as long as possible when the driving power is cut off, and all these things are immensely important because the safety of the aircraft may depend on them.



And it follows, the co-pilot said, that the gimbal bearings must be pretty nimble and as free from friction as possible.

Lubricants, old son.

Esso.

Yes, the bearings lubricant (it may be either grease or oil) must be of the highest possible quality and purity. No dirt, no drag. The lubricant must match the instruments themselves in precision and reliability; and the instrument manufacturers take infinite pains to supply the denizens of the control-cabin with first-rate reading matter. (The gyroscopes are assembled in air-conditioned chambers and undesirable alien particles of dust are rigidly excluded.)

Very hygienic.

So it's up to the boys in the air-conditioned small back rooms of the *Esso* outfit to brew a lubricant of super-fine quality, consistency and performance.

They do——

It pays to say

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PASSING OF THE TIGER . . .

and has, moreover, come safely through the mill, so that he feels that it would be anti-social and ungrateful not to record his appreciation of the many pleasant hours spent at the controls of the Tiger Moth, mostly playing truant. Time has blunted the edges of his growing pains, so that he remembers now most vividly those occasions when he was able to escape from the discipline of routine exercises, and indulge his carefree fancy. The manœuvres which accompanied these relapses may not have won the approval of the canons; but anyone who has flown the Tiger for any length of time must agree that it was the complete antithesis of the book of rules. In fact, it was impossible to make friends with it at all, unless one realized that it had to be flown in its own special way. The pundits who insisted always on flying the Tiger with a view to applying the practice to larger and faster aircraft were making an awkward and stubborn mule out of a sweet and willing mount. But when one treated the Tiger as an aircraft in its own right, and not as a half-scale try-out, one found that a friend had been made, one who could be trusted never to turn vicious in adverse weather conditions. One always felt safe in a Tiger Moth, even in the most ham-fisted training days. If, sometimes, the hands of those who flew the Tiger were bitten, their wounds were just reprisal for maltreatment.

However, whatever the viewpoint, the time will soon be here when it will matter no longer. In the next decade, the sight and sound of a Tiger purring its way across the sky is going to become increasingly rare. There is little doubt that the retirement of the famous type will be a long and honourable one, and that it will eventually become one of the most prized vintage aircraft—though perhaps a few will find their way into a museum of instruments of mediæval torture. M. N. M.

THREE NEW BOOKS

"Physical Aspects of Air Photography," by G. C. Brook. Longmans, Green and Co., Ltd., 6 and 7, Clifford Street, London, W.1. Price 56s.

MANY are the text books dealing with the photogrammetric or mapping side of aerial survey, but few of them discuss in detail the purely photographic and optical problems. The present volume by G. C. Brook, who is at the R.A.E., Farnborough, deals almost exclusively with the physical problems which have to be overcome to obtain the clearest and sharpest photographs which any particular set of conditions will allow.

The higher the resolution obtained in air photographs, the smaller the scale will be at which they will be satisfactory to the mapmaker, interpreter, geologist or whoever has to extract information from them. The smaller the scale required, the greater the area covered for a given amount of flying—in other words, good photography cheapens air survey. This excellent book shows the way.

"The Stories of Flying Officer 'X'," by H. E. Bates. Jonathan Cape, 30 Bedford Square, London, W.C.1. Price 10s. 6d.

"SOME books are to be tasted, others to be swallowed, and some few to be chewed and digested," wrote Francis Bacon. Reviewers, unfortunately, have to chew and digest each and every book, even when, as in this case, it should, like fine brandy, be sipped and enjoyed at leisure. As a result one sees faults that are not really important—too many of Mr. Bates' aircrew have lost parents or children by bombing, too many of them suffer too long, adrift in rubber dinghies, and so on.

It is only after one has laid the book aside, and read other "realistic" novels of the Royal Air Force, full of salacious bookstall appeal, that the true ability of H. E. Bates becomes apparent. His characters are decent, ordinary people, doing the extraordinary things that ordinary people do when swept from their peaceable home life into the maelstrom of war. Some, like bomber captain Eddington-Green, become great pilots, although "he had no medals." Others reveal an inner greatness and tenderness, like the little W.A.A.F. telephonist who watched every crew but her husband's return from a bombing raid, and could still smile and call it a wonderful show.

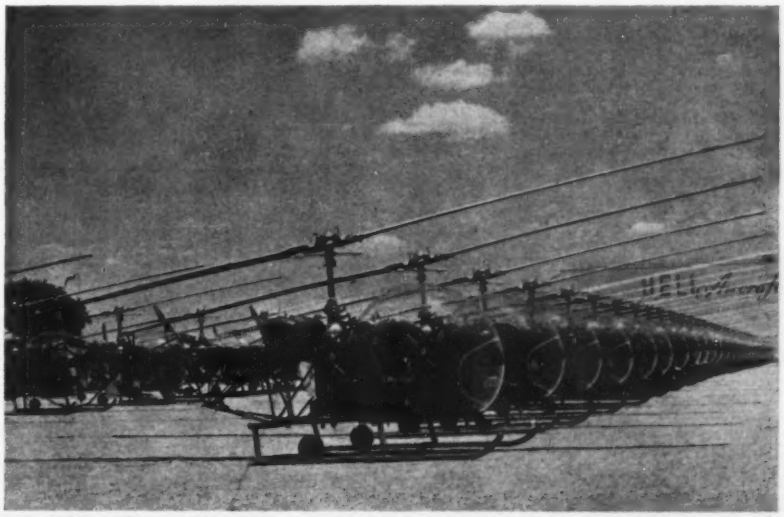
There is not a word wasted in this whole collection of 18 short stories, many of which were published during the war as *The Greatest People in the World* and *How Sleep the Brave*, by Flying Officer "X". Bates introduces his characters in six or seven lines and the reader knows all about them, because they are the sort of people we all knew, great people, recalled in a book that is in every way worthy of them

"Our Fighting Jets," by Major C. B. Colby, C.A.P. Coward-McCann, Inc., New York, U.S.A. No price quoted.

AMERICA is not yet recognition-minded. Her people are fortunate in never having seen an enemy aircraft over their own country, and the new U.S. Ground Observer Corps is having to struggle along with a minimum of equipment and support from either the Government or people as a whole.

Maj. Colby has done his best to produce a book that will give Americans both a pride in their country's warplanes and an interest in aircraft recognition. The result is probably the best effort of its kind on the other side of the Atlantic, but can only make members of our own Royal Observer Corps realize how lucky they are.

Altogether, 22 U.S. jets are described and illustrated. In each case, the entire right-hand page is devoted to one photograph, and these are, on the whole, very good, especially the new pictures of a Cutlass, F-86D Sabre and XF-88 Voodoo. The text, although a little Technicoloured, is probably ideal for Major Colby's potential readership; but he seems to have got his "X" and "XF" designations a trifle confused.



DECORATIVE LINE-UP: These Bell Model 47 helicopters—claimed to be probably the largest number of completed rotary-wing craft to be assembled in one place—await delivery at the company's Saginaw, Texas, works. Assembled and flight-tested at the makers' new plant at Hurst, Texas, the aircraft are ferried to Saginaw for crating and shipping. The usual power-plant of the Model 47 is a 178 h.p. Franklin 6V4-178-B.32 mounted vertically, or a 200 h.p. Franklin 6B4-200-C.32 flat six.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

Club Hours

IT is with much interest that members of this club have read in your magazine of the number of flying hours recorded by other aero clubs throughout the world. During the last two years we have made determined efforts to increase flying hours and this effort has produced results. A yearly flying scholarship has been instituted and an increased number of competitions and night flights, etc., are taking place. After the first six months of our last financial year it appeared that the flying hours for the year would be approximately 4,800 but during the second half of the year an abnormal spell of bad weather caused us to lose the 400 hours increase we had made over the same period for the previous year, rather than gain a further 400 hours.

In the hope that it may be of interest to your many readers, we detail below hours flown by this club during the past four years when approximately 10 aircraft were being operated at a time. Our present fleet consists of two Geminis, one Proctor, one Chipmunk, one Auster Aiglet and five Tiger Moths.

	1949	1950	1951	1952
Dual instruction	788	691	880	692
Solo, advanced	1,193	953	1,377	1,138
Solo, training	327	265	479	494
Other flying including commercial work	563	657	1,335	1,735
	2,871	2,566	4,071	4,059
Government flying training included in above	370	488	768	544

It will be noted that commercial flying hours are increasing year by year and it is for the purpose of maintaining members' flying fees at as low a figure as possible that the club has entered the commercial field. Whilst this is not altogether a desirable situation for a club to be in, rising costs compel us to offset the profits from commercial activities against the losses from club flying.

Although it is not a record, the hours flown last week-end (including Friday) were 108.55.

A. B. CUNNINGHAM,
Wellington, N.Z. Secretary, Wellington Aero Club, Inc.

[This is the letter to which we made brief reference in our "From the Clubs" page last week.—ED.]

Transports, Civil and Service

THAT expansion and re-equipment of airlines must soon take place is obvious from the contents and editorial of your Commercial Aviation Number published some few weeks ago. Despite one or two gaps, British aircraft could fill most of these requirements.

The money to purchase these aircraft will not, as Henry Morris points out in the same issue, come from a World Bank loan such as K.L.M. have negotiated for the purchase of U.S. types. A new approach is needed, or many airlines (who would Buy British if they could raise the capital) may follow suit. A Government-backed hire-purchase scheme might be the answer. If foreign airlines were offered the chance to re-equip with British aircraft by paying a deposit and the balance over a period they could get more efficient aircraft much sooner, and, from the increased earnings that followed, the aircraft would "buy themselves" during service. Obviously, the manufacturers could not afford to wait for their money, but if they took the deposit and the Government paid them the difference, the balance-payments could be made direct to the Treasury. This would ensure a steady flow of foreign currency over a period of years. Terms could be worked out to suit the individual airlines.

Objections will be raised that currency fluctuations and possible bankruptcy of the purchasers would make the idea impracticable; but most airlines are now firmly established, demand will continue, and, with new aircraft, profits should rise.

On another topical subject, many famous speakers have recently emphasized the great need for a strong and efficient R.A.F. Transport Command. Already enough has been done to relegate to history a standard R.A.F. joke ("Transport Command? . . . Oh, you mean the Vikings of the King's Flight"); but finance again rears its ugly and ubiquitous head to prevent the full expansion we would wish.

Is there no possibility of integrating our air-transport resources in a more economic fashion to achieve both the expansion and the money necessary for it? We are told that it is cheaper to move troops over certain routes by air than by sea, and there is also a great time-saving; these aircraft at least should pay for themselves. It is the initial outlay that is the difficulty, but it is largely obviated here as much air trooping is done by private companies under charter. It is probably against all Service tradition, but might it not be possible to work in the reverse direction? Could not private companies, when circumstances permitted, charter R.A.F. aircraft which would then be doing even more to pay for themselves? For instance, looking to the future, we hope the Blackburn Universal will be in R.A.F. colours, and surely there is a possibility of it being produced for NATO countries financed by U.S. dollars, which would bring the price down nearer the R.A.F. level. I suggest that Silver City might "borrow" one or two at rush periods, such as Whitsun and August Bank Holiday, when the R.A.F. nowadays are usually on leave—that is, their period of inactivity coincides with maximum need for the car ferry. I do not claim it would work, but there might be a chance.

B.E.A. and B.O.A.C. might also find use for temporarily inactive R.A.F. transports if all parties kept each other informed of current requirements and availability; but such liaison *must* be carried out with real efficiency and not surrounded by needless red tape; neither must large staffs be employed for this liaison or for administering the financial arrangements (and how the Ministries love involved "book transfers"!) or the gain on the swings will be quickly squandered on the roundabouts.

Cambridge. PEDANTICA.

Cambridge Contrails

I FEEL that your readers (and in particular "G. N. N.," whose letter appeared in your issue of August 1st) may be interested in the phenomena described below.

At precisely 1900 hr on the evening of August 5th, I observed an unusual sky-trail passing over Cambridge from east to west, and remembering "G. N. N.'s" letter, turned it up to see how my observation compared with his.

The line assumed the form of a vapour trail, but was rapidly spreading out, and lay above me at a height of about 3,500ft. It was about a mile long and dark grey in colour. It did not assume a vee shape in section, however, and did not seem to taper.

Thundery conditions existed at the time and a storm was passing well to the south of the city. Cumulo-nimbus clouds covered about five-eighths of the sky and a mixture of low, medium, and high clouds covered the rest. This unusually dark trail stood out well against a patch of white cloud above. There was hardly any wind at the time of observation, but by 1910 hr the trail had disappeared.

No American jet aircraft had passed over during the afternoon and evening. Two aircraft were flying over at the time—one well above cloud and almost certainly a B-50D and the other, a Tiger Moth, at about 2,000ft, doing steep banks. The Tiger, however, came upon the scene after the trail was noticed. I feel sure that no aircraft was responsible for this phenomena.

Did the pilot of the Tiger notice it? Can anyone explain it?

Cambridge. M. J. F. BOWYER.

FORTHCOMING EVENTS

Aug. 23. Coventry Aeroplane Club: Air Day and Siddeley Challenge Trophy Race.
Aug. 23-24. Aéro-Club de Trente: Dolomites Circuit.
Aug. 30. Midland Aero Club: Display.
Aug. 31. A.B.A.C.: Summer Convention.
Aug. 31. S.M.A.E.: British Model Championships, College of Aeronautics, Cranfield.
Aug. 31-Sept. 7. Scandinavian Air Rally.
Sept. 1-7. S.B.A.C.: Flying Display and Exhibition, Farnborough.
Sept. 7. "Yorkshire Evening News" Model Festival, Sherburn-in-Elmet.
Sept. 14. Milan Aero Club: Milan Grand Prix.
Sept. 15. Battle of Britain Day.
Sept. 15. I.A.T.A.: Eighth Annual General Meeting, Germany.
Sept. 17. Golf: R.N. and W.R.N.S. v R.A.F. and W.R.A.F., Camberley.
Sept. 20. R.A.F. At Home Day.
Sept. 21. S.M.A.E.: Models Contests, Butlin's Holiday Camps.
Sept. 24-25. Aerodrome Owners' Association: Annual Conference, London.
Sept. 28. Aéro-Club de France: Coupe Stemm Helicopter Competition.
Sept. 20. British Interplanetary Society: Report by British Delegation on Stuttgart Congress.
Sept. 30. Southern Aero Club: Rally, Shoreham.
Nov. 8. British Interplanetary Society: "Evolution of Life in the Universe," by Prof. J. D. Bernal, F.R.S.

The Valiant

The

Martin-Baker Patent

Ejection Seat designed for

high speed aircraft

Martin-Baker

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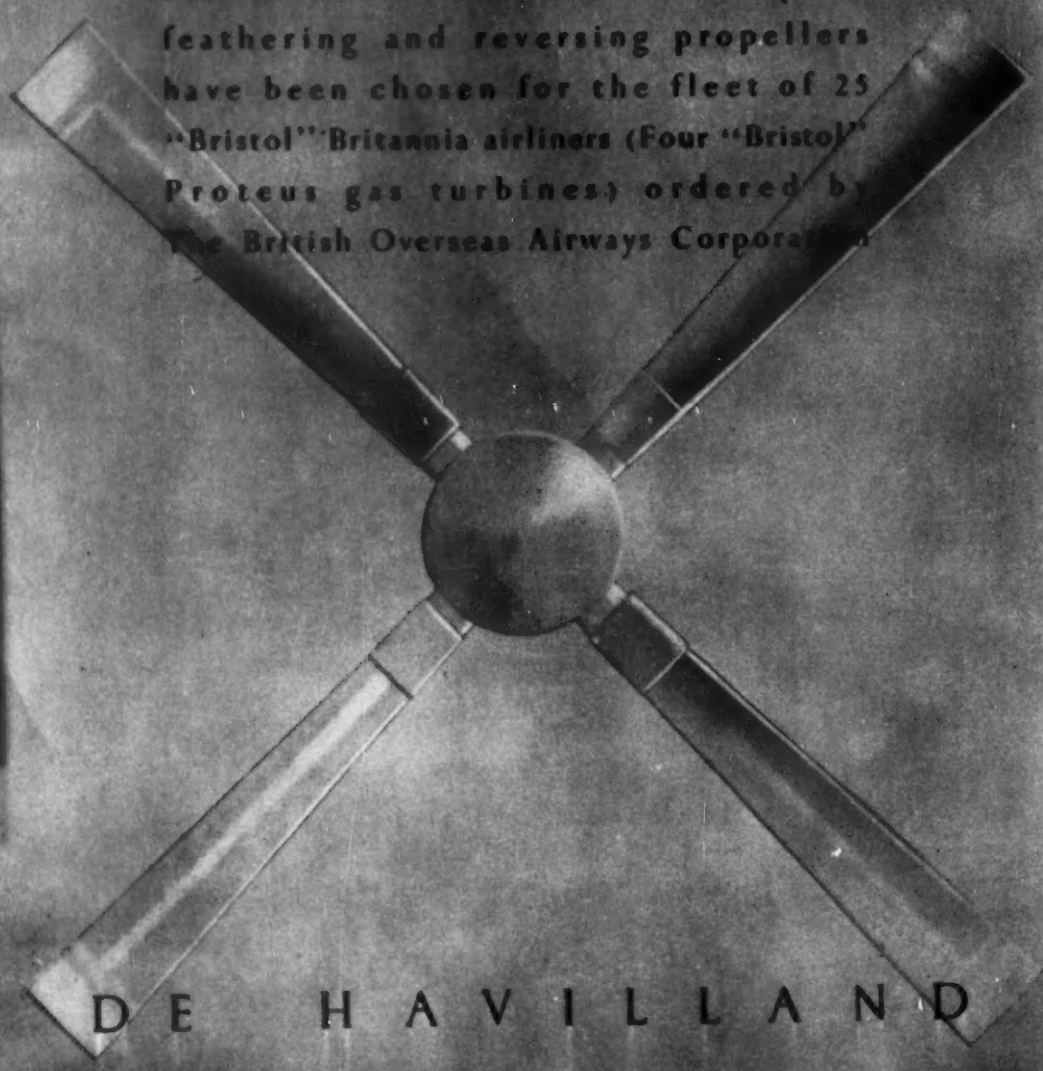
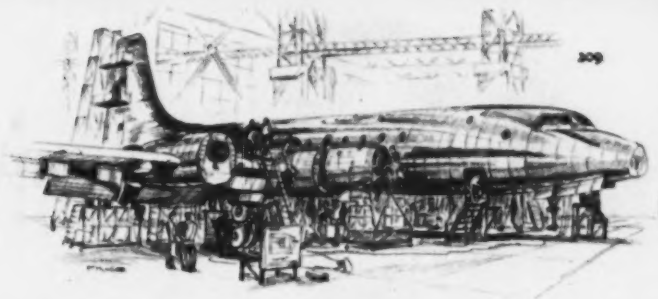
de Havilland
hollow-steel-blade constant-speed
feathering and reversing propellers
have been chosen for the fleet of 25
"Bristol" Britannia airliners (Four "Bristol"
Proteus gas turbines) ordered by
the British Overseas Airways Corporation

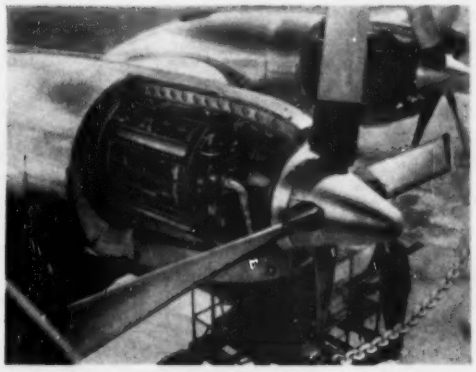


DE HAVILLAND

Design Analysis of the New Turboprop Airliner



THE BRITANNIA



The Proteus 2 turboprops in the first prototype are very neatly installed, the cowling design offering maximum accessibility. The D.H. hollow-steel airscrews are 16ft in diameter.

THAT the Britannia is an aircraft with the promise of outstanding merit has already been made abundantly clear in various articles published in *Flight* earlier this year.* These reviews, however, were concerned in the main with performance expectations, whereas now it is possible to examine the aircraft as a study in design skill.

When visiting Filton a few weeks ago we were taken up to the catwalks which traverse the great roof of the Brabazon hangar, and from that eminence looked down on the first and second prototype Britannias, the former then nearing completion. Whilst gazing down at the aircraft, it was borne in on us once again that to all superficial appearances the Britannia, handsome as it is, is quite an ordinary aircraft: there is nothing about it to strike the observer as outstanding or novel; in short, there is nothing on which one can fasten as justifying the out-of-the-ordinary qualities that one believes the aircraft to possess.

Why is this? In the briefest terms, the answer is simple—and, like most seemingly simple things, has a deal of complication behind it. Aerodynamically, the aircraft is clean; it has, in fact, an overall drag-coefficient of an order according with the best modern practice for largish commercial transport types. This has been attained, moreover, in conjunction with a capacious fuselage. What is the more unusual, however, is that the carrying capacity of the body volume is usable to a much greater degree than is normally the case, this being permitted by the aircraft's astonishingly low percentage structure-weight. Directly linked with this is the low installed weight of the power installation, and on the other side of the picture there is the high efficiency of the engines—a reflection of their low specific fuel-consumption and high specific power-output. Include with all these qualities a markedly generous fuel-tankage capacity, and one has all the essentials for an outstanding aircraft. It is as simple—and as difficult—as that.

The evolution of the Britannia was not, however, a smooth process; the design history goes back a long way and it is perhaps because so much time was spent in argument and conference between the company, B.O.A.C. and the Ministry, that the design had the opportunity to mature; to mature, that is, in the sense of achieving some measure of development. Let us take a glance over the background highlights.

The first germ of the idea was found in the Type 3 recommendation of the famous 1944 Brabazon Committee, but in 1946 the essentials of the Brabazon 3 type gave way at the instigation of B.O.A.C. to the "Medium-Range, Empire" specification. During April of the following year, Bristols tendered a design-study in competition with ten other companies and learned in the July that it had been considered as the most promising of the designs submitted; this was the first concrete appearance of the Bristol 175. In October, 1948, B.O.A.C. proposed that the 175 should be fitted with Proteus turboprops instead of Centaurus piston-engines, and the following month they announced their intention to order 25 production aircraft. The actual agreement to purchase 25 production 175s was signed in July, 1949.

In November of that year the decision was taken to build a non-flying prototype and, as readers of the March 7th, 1952, issue of *Flight* will know, this decision was of the most profound importance in its influence on the later progress of the aircraft. By October, 1950, scale versions of the Britannia's servo-rudder, tailplane and elevator had been flight-proven on an adapted 170 Freighter and, following completion of the primary structure of the non-flying prototype and the full-scale wing and half-scale fuselage structural test specimens, building of the first (flying) prototype started in January, 1951. At the time of writing, five sets of detail parts for production aircraft are extant, and the fuselage structures of the first two production machines are nearly complete.

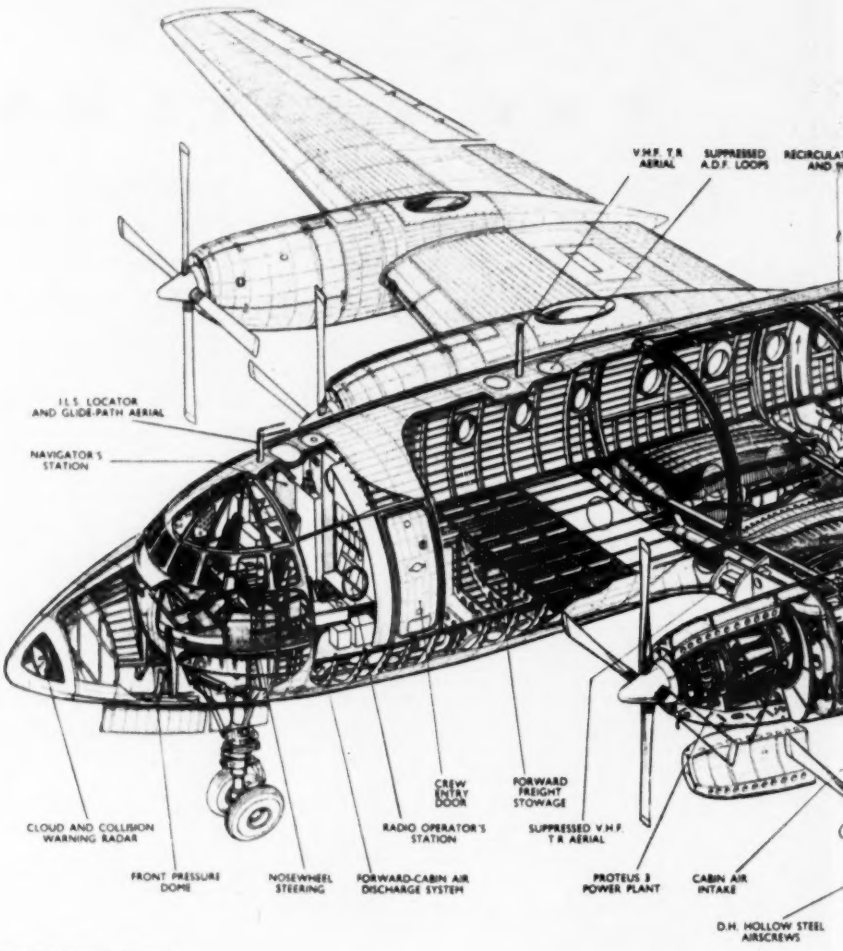
So much for the historical sequence of events. As regards the design development of the aircraft, it may be said that dozens of solid shapes were tunnel-tested in order to find that which afforded the best compromise between form and structure. As already mentioned, the efficiency of the Britannia is in no small measure due to the low structure-weight, and basically this is directly linked with the use of a straight taper wing and as lengthy a parallel trunk of fuselage as the aerodynamic considerations would permit. Within these parameters, however, the actual structural form employed could have been any one of several variations on the classical semi-monocoque theme. In the event, the use of multiple close-spaced stringers with comparatively few frames or ribs, in conjunction with skin plating of the lightest practicable gauge, was decided upon largely as a result of the studies made for the Brabazon project.

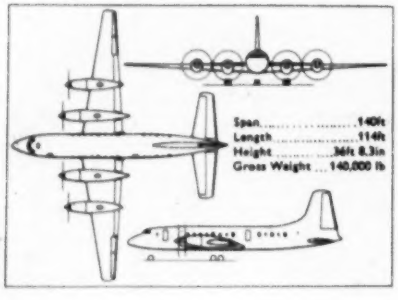
It is unfortunate, to say the least, that in the public mind the Brabazon should be regarded as a white elephant, and a extremely expensive white elephant at that. In point of fact, that giant aircraft still represents a considerable advance in aircraft technology—in many respects is still a good deal in advance of its time. The fundamentally important thing about the whole project is, however, that in order to build the Brabazon the Bristol Aeroplane Company were forced to make the most exhaustive investigations into structural techniques and material limitations. As a result, they obtained an enormous mass of definitive data, enabling them to select with certainty the precise optimum answer to a particular structural problem. As for structures, so for other aspects of aircraft design: we do not imply by these comments that Bristols know all there is to know about designing and building aircraft—fortunately, it is a matter which is constantly in a state of flux—but there is little room for doubt that, as a result of having built the Brabazon—as a result of having been *able* to build the Brabazon—the company derived a wider and, at the same time, a more exhaustively detailed knowledge of structural optima than that possessed by perhaps any other one company.

The production technique adopted for the Britannia also owes more than a little to the Brabazon studies. For example, the fuselage is plated in skin panels of unusually light gauge, the material being D.T.D. 746 close-tolerance sheeting and, in order to preserve surface-finish, a dimpling process is used. The panels

* *January 25th, February 29th, March 7th, May 16th.*

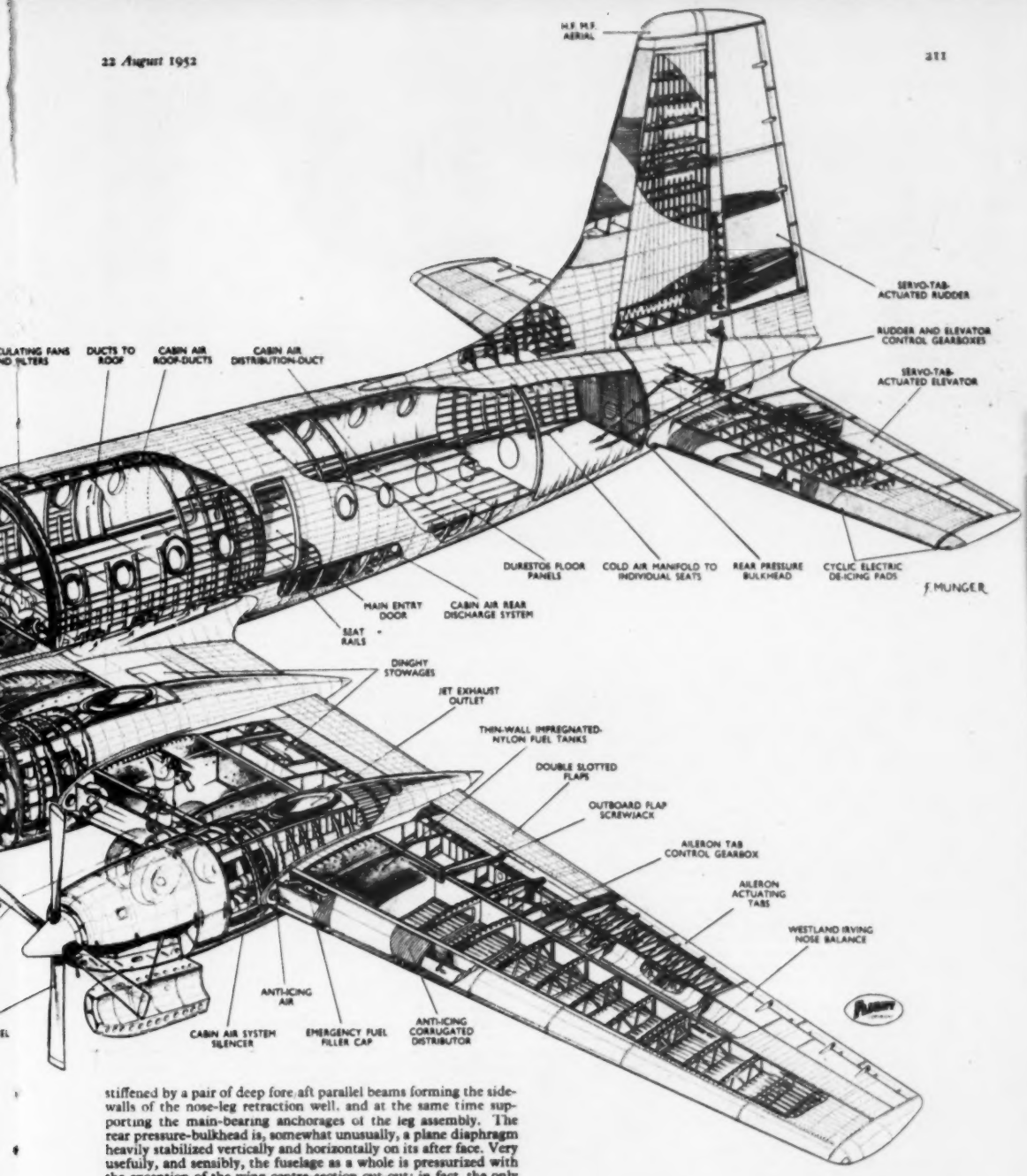
THE BRITANNIA





are first formed to the requisite curvature, and are then jig-drilled with pilot holes at the rivet stations. They are then dimpled to give effective countersinking for flush-headed rivets without removing any metal. The dimpling process has a second-order effective advantage in that the heat generated by tool friction anneals the metal locally and so prevents the development of radial cracks—the material subsequently age-hardens, of course. Redux metal bonding is used liberally in the secondary structure—e.g., for the leading-edge ducting, for box-ribs and local skin reinforcement—but is not used in the primary structural joints.

The fuselage, as already stated, is cylindrical for a considerable portion of its length—for about 40ft in fact—its 12ft diameter then diminishing to 10ft and 8ft 4in at, respectively, the forward and rearward pressure-bulkheads. The former is a truncated hemispherical dome incorporating the cockpit glazing as an integral part of the structure. The truncation diaphragm is



THE main structural make-up of the Britannia is well-illustrated in this exclusive "Flight" drawing by F. Munger, and a clear impression is also conveyed of the unusually large and unobstructed capacity of the fuselage. It is, of course, in its payload-capacity/range/speed performance that the Britannia holds promise of being so outstanding an aircraft.

stiffened by a pair of deep fore and aft parallel beams forming the side-walls of the nose-leg retraction well, and at the same time supporting the main-bearing anchorages of the leg assembly. The rear pressure-bulkhead is, somewhat unusually, a plane diaphragm heavily stabilized vertically and horizontally on its after face. Very usefully, and sensibly, the fuselage as a whole is pressurized with the exception of the wing centre-section cut-out; in fact, the only difference between internal atmospheric conditions in the cabin and in the under-floor freight-holds is that the latter are not humidity-conditioned.

With the exception of the pilots' floor, which is raised about a foot above the general level, and the rearmost 10ft of the cabin, which is floored 12in below the general level in order to give adequate headroom, the main run of the cabin floor is approximately 18in below the centre line of the fuselage. Structurally, the floor comprises a grid framework supporting eight longitudinal

To all appearances externally complete, except for the inboard actuating tabs on ailerons, elevators and rudder, the first prototype glistens in the sun on its maiden emergence from the Brabazon hangar at Filton.

THE BRITANNIA . . .

rails on which the seats are carried. The rails are drilled with holes at 1in pitch, so that the flexibility of seat arrangement is singularly high. The flooring between the seat rails is easily removable, and comprises Durestos-faced sandwich panels with end-grain balsa filling.

The fuselage as a whole is structurally simple, and is skinned with light-gauge sheet on continuous close-pitch Z-section stringers, for which the Z-section hoop frames spaced at 20.5in are notched. Skin panelling, stringers and frames are graduated in gauge according to the bending moment distribution. Manufacture of the fuselage, incidentally, is based on a high degree of sub-assembly, in that the panels are built up in bench-jigs as finished structures complete with stringers and frame segments, the panel sub-assemblies then being finally united with their adjacent fellows in the main assembly jigs. The unpressurized tail-cone and empennage are built as an integral structure with the pressurized after part of the fuselage, the tailplane and fin being detachable and of similar basic construction to the wings.

With a taper ratio of 3.23 : 1, and an aspect ratio of 9.53, the elegant wing of the Britannia is designed with the 80 per cent chord line orthagonal to the fuselage axis. Taper and dihedral are uniform from the centre-line to the tips, the aerofoil changing from an N.A.C.A. 25017 root section to a modified N.A.C.A. 4413 tip section, in conjunction with a washout transition of 2.4 deg.

Accordingly as one's allegiance lies in design philosophy, the wing can be regarded as being a two-spar torsion-box structure or, alternatively, as a torsion box-spar structure the front and rear walls of which are made up of shear webs. In view of the token use of ribs, the latter is perhaps the more apposite description : the torsion box, then, is of 35 per cent. chord, in that it extends back from the 15 per cent. to the 50 per cent. station. The upper and lower skins of the box are carried on close-pitch spanwise extruded Z-stringers which all run parallel to the rear wall of the box and thus progressively become fewer in number as the wing tapers. From just inboard of the wing root out to the aileron, the interior of the spar box is taken up by fuel tanks, of which there are no fewer than nine a side. Compartmentally, the tanks—which are thin-walled impregnated-nylon bags—are arranged in three groups of three, but the fuel-line arrangement is such that the tanks are inter-connected as groups of four inboard and five outboard. Inter-tank ribs are double-skinned diaphragms, Reduxed to a corrugated interlayer, whilst the internal spar-ribs outboard of the tank volume are of girder-braced form with light-gauge channel members.

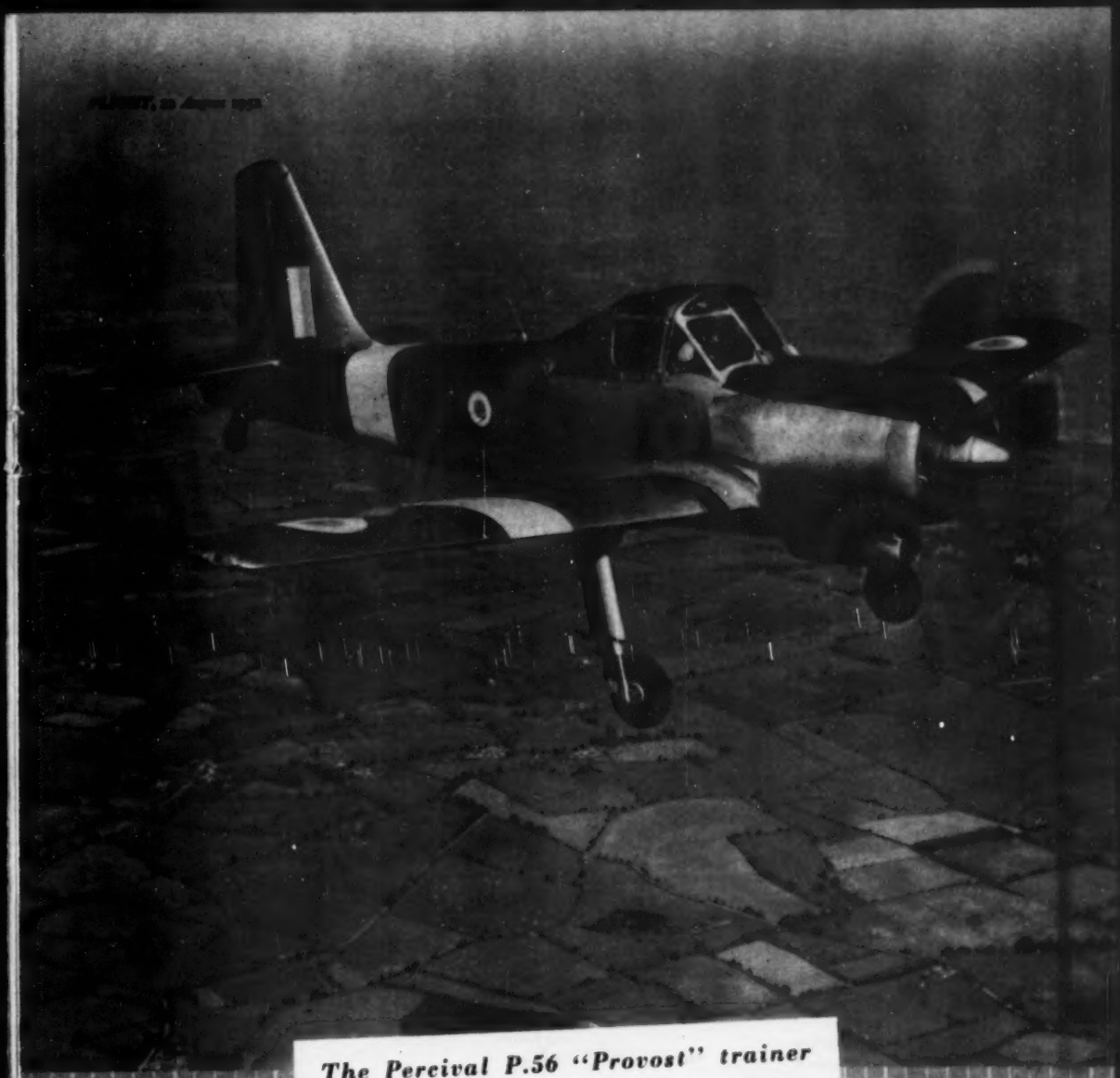
The leading edge of the wing has been governed in structural design by the decision to provide hot-air anti-icing protection over the first 15 per cent. chord. The nose skinning is Reduxed to corrugated distributor panels and, in conjunction with a shear web at 6 per cent. chord (which serves as the rear wall of the hot-air duct), so forms a stressed structure as well as providing for the anti-icing function. The duct is lined with resin-bonded Fibreglass 0.014in thick to the skin, and 0.007in thick to the rear wall, not as lagging, but as duct "smoothing" to minimize flow restriction. The duct wall is stabilized to the front of the main spar-box by radius struts at 50in pitch.

The trailing edge of the wing is essentially a light air-loac transfer structure, and forms a fairing to the double-slotted flaps which extend in inner and outer pairs from the fuselage out to the ailerons. The trailing-edge skin is supported on deep top-hat-section chordal members which, at the aileron hinges and flap tracks, are incorporated with diaphragms to form box ribs. The flaps are carried on curved tracks, machined from steel forgings, and run in the tracks on steel-roller carriages. Each outer and inner flap is actuated by a pair of screw jacks, served by torque shafting from duplicated electric motors in the centre-section.

Ailerons are straight-taper wedge-section surfaces, with a 14.7 deg trailing-edge angle, and are skinned in 26-gauge panelling on 30-gauge top-hat tubular-braced chordal members, abaft a nose torsion-spar of Irving/Westland form, the "beak" of which carries a fabric balance-diaphragm.

A novel feature of the Britannia is the structural form of the nacelles. Each nacelle is an integral element of the wing, the conventional inter-spar ribs in way of the nacelles being replaced by pairs of chordal diaphragms above and below the spar-box. These vertical webs, in conjunction with frame formers notched for the chordal stringers, stabilize the nacelle skin panelling, and at the same time the two upper diaphragms form an enclosure for the upswept jet-pipe, whilst the lower webs (of the inboard nacelles) accommodate the radius struts of the main undercarriage legs. The nacelles are thus semi-monocoques, the forward terminals of which are the firewalls of heat-resisting steel. It is to four anchorage points on the firewall that each engine mounting is attached. The engines are, of course, Proteus 3 turboprops (705 series), the initial performance of which, as reported in the June 6th issue of *Flight*, handsomely exceeded the design values, both in terms of power output and fuel economy. A great deal of development work by de Havilland Propellers, Ltd., has gone into the manufacture of the 16ft. dia. hollow-steel airscrews, which, of course, in addition to the normal constant-speeding and feathering functions, also provide reverse-thrust braking. Although the airscrews are hydraulically actuated, the control for speed selection, constant speeding, synchronization, etc., is electrical.

Before leaving the nacelles, a word or two might be said about the undercarriage. As in the case with the twin-wheeled steerable nose assembly, the main units of the landing gear are by British Messier, and are fitted with Dunlop wheels and brakes. Each



The Percival P.56 "Provost" trainer with the Alvis Leonides Engine

ALVIS

LEONIDES

ALVIS LIMITED, COVENTRY, ENGLAND

more and more people *(Over 1,000,000 in 1951)*

more and more goods *(Over 10,000,000 kilograms in 1951)*

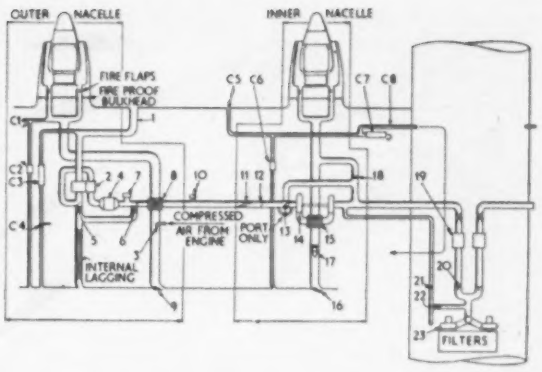
more and more miles *(Over 260,000,000 passenger miles in 1951)*

more and more routes *(now to 60 destinations in Britain and Europe)*

are flown each year by **BEA**

BRITISH EUROPEAN AIRWAYS

1. Fresh-air intake
2. Cabin blower (two-stage)
3. Jet pump (ground only)
4. Silencer
5. Spill valve (for mass-flow control)
6. Dump valve (to off-load blower)
7. Relief valve
8. After-cooler
9. Cooling air flap (for 8)
10. Pressure test connection (3 in.)
11. Filter
12. Throttle valve (for heating control)
13. Refrigerator valve (by-pass)
14. Refrigerator (free running)
15. Refrigerator cooler
16. Cooling flap (for 15) (coupled to 13)
17. Ground operating fan
18. Direct ventilation valve
19. Water separator
20. Non-return valve (main air supply)
21. Non-return valve } Individual cold air supply—port only
22. Non-return valve }
23. Recirculating fan (with n.r.v.)
C1. Supply to gearbox cooling
C2. Alternator (outer nacelle)
C3. Rectifier (outer nacelle)
C4. Jet pump (ground operation) for C3
C5. Air intake
C6. Alternator (inner nacelle)
C7. Rectifier (inner nacelle)
C8. Spar ventilation supply



Schematic diagram of port wing and fuselage installation of cabin air conditioning system. The starboard wing installation is, to all intents and purposes, a duplicate.

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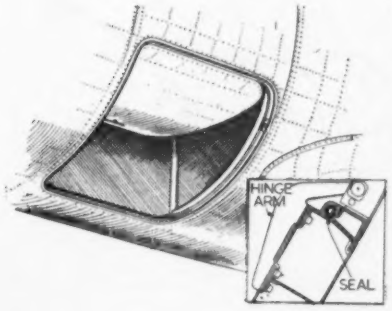
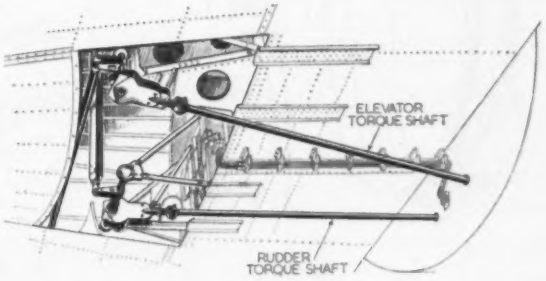
main oleo leg carries a bogie beam pivoted so that, prior to retraction, the wheels can be swung up to a position in which the common plane through the axles is substantially parallel to the axis of the leg. In the landing condition the bogie is free to pivot through about 15 deg at low angular velocity, but is fitted with a damper to prevent the more rapid oscillations. Another ingenious feature of the design is that the disc-type brakes are articulated to a torque-reaction linkage whereby full compensation is provided and load transfer to the front wheels thus neutralized. The main tyre pressure, incidentally, is 125 lb/sq in.

The attack made by Mr. Russell's design team on the problem of primary flight-controls was, perhaps, not uninfluenced by the Brabazon studies, if only in going full circle and coming to the conclusion that (for the Britannia, anyway) all the immense complication of powered-control systems in the modern manner was just not worth while. So, on the basis that tabs have been used both for trimming and servo purposes for a long, long time, and their habits are now fairly well understood, it was reasoned that the most simple, effective and probably most efficient way of moving the control surfaces was to fit them with servo tabs and connect the pilot's controls to the tabs rather than to the parent surfaces. (In this context, credit must be given to Mr. D. J. Lyons and his colleagues at the R.A.E., for the initial development of the servo-tab system as a primary control-actuation medium.) This delightfully simple solution is, however, not without its drawbacks; for example, so far as stick forces are concerned, the hinge moments are much too small to serve adequately as sources of "feel" for the pilot. A method of introducing the requisite degree of feel had therefore to be evolved, but here again the system devised has the attraction of essential simplicity. In brief, proportional feel has been introduced by incorporating torsion springs in the control transmission linkages, the exertion of the springs being modified by a pitot system to compensate for flight speed. The artificial-feel system on the Britannia does, in fact, give the pilot an ideal stick force per degree of control-surface displacement, and this stick force increases proportionately with increase of speed. As already mentioned, the system was flight-proven as long ago as October, 1950, on a modified Type 170 Freighter. It would seem not unlikely that in its flight-control system, as in other aspects, the Britannia may well set a new standard of aircraft practice.

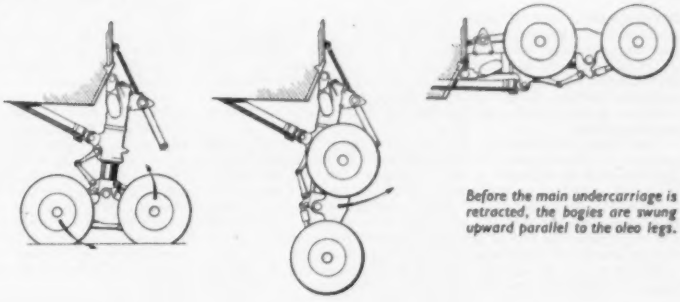
The cabin atmosphere conditioning system is remarkably



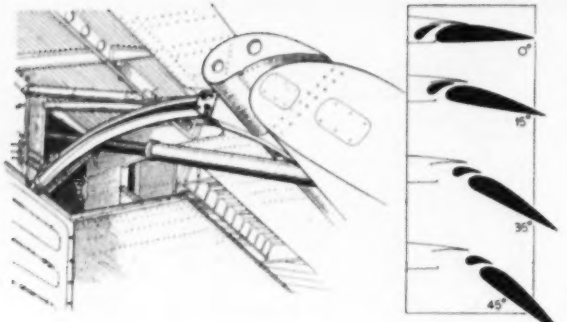


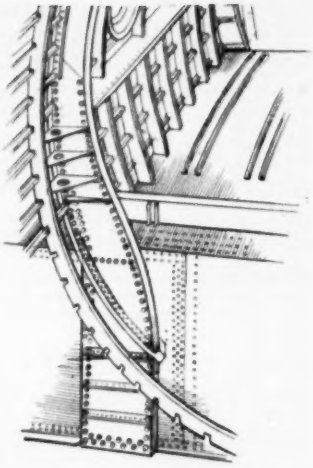
(Above) Access door to under-floor freight hold, showing hinge detail and pressurization seal.

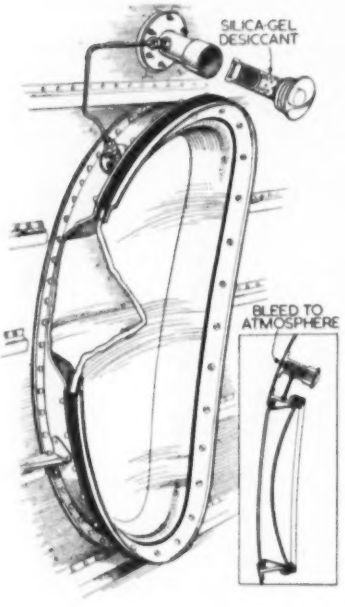
(Above, right) Layout of control transmission torque shafts and gearboxes in fuselage tail-cone.



Before the main undercarriage is retracted, the bogies are swung upward parallel to the oleo legs.





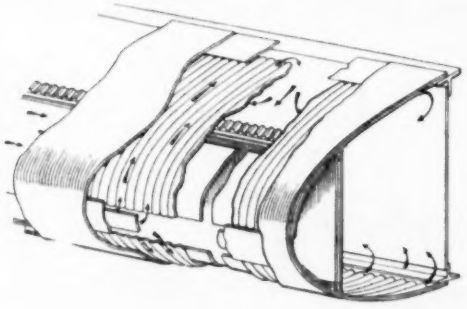


(Above, left) The four-position double-slotted flaps run on curved tracks and are actuated by direct-acting electric screwjacks.

(Above, right) The union between the main frames and the spars (port frame/rear spar is shown) is made with fine-limit bolts through frame booms, spar booms and webs.

(Left) Cabin windows are dry-air sandwiches, glazed with Perspex, the inboard panels being of ellipsoidal contour. The arrangement of the desiccant pack is admirably neat.

(Below) Wing leading-edge anti-icing protection is vested in the distribution of hot air along a nose duct serving corrugated distributor panels Reduxed to the inside of the upper and lower surfaces.



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comprehensive, and utilizes two independent supplies, one in each wing. The outboard nacelles house the engine-driven blowers, silencers, after-coolers and off-loading spill valves, whilst the inboard nacelles accommodate the refrigerators and their coolers, and the ground-running fans. The water separators, recirculating fans, smoke filter and deodorizer, pressure control valves and the distribution system, are housed in the fuselage centre-section.

The maximum working differential pressure of 8.3 lb/sq in permits sea-level pressure to be maintained in the cabin up to a flight altitude of 21,000ft; a cabin equivalent altitude of 5,000ft up to an actual of 32,500ft; and *pro rata*. Pressure control is automatic, and can be pre-set before take-off, both to determine the height (usually 2,000ft) at which pressurizing begins, and also to regulate the rate of change of cabin pressure. The normal "cabin climb" is 100ft/min, but any rate between 100ft and 1,000ft/min can be selected. Cabin temperature can be maintained automatically at any selected value between 17 deg and 24 deg C for ambient temperatures between −70 deg and 27 deg C. Air-cycle turbine refrigerators cool the air in very hot and humid conditions and, in conjunction with the water separators, also serve to keep the relative humidity of the cabin atmosphere below 70 per cent. for all possible hot and humid ambient conditions. Conversely, the cabin humidity in dry cabin conditions may be raised to 30 per cent. by the injection into the ventilating air of steam from an electric boiler, the on/off switching of which is controlled automatically by a humidistat.

There is, of course, much more to be said about the Britannia, even in the most briefly general terms. In these few pages, however, we feel we have written enough to give a clear understanding that, as an example of commercial aircraft design, the Britannia is at the moment in a class of its own. It is patently an aircraft capable of considerable development, yet is starting its working life at a point above that reached by the ultimate versions of the classic aircraft of the past decade. Which, of course, is just as it should be. It is, nevertheless, a pleasant feeling to know that Britain is producing an aircraft which, on economic grounds alone —and quite aside from its other outstanding qualities—is exercising a great deal of the attention of airline operators all over the world.

LOOKING ROUND ITALY

A Cross-section of the Industry and its Possibilities as NATO Potential

By JAMES HAY STEVENS

WHEN making a business visit to Milan and its surrounding industrial areas recently, the writer had the opportunity of visiting units of the Italian aircraft industry and of discussing affairs in detail with a number of reliable authorities. What follows is an amalgamation of experiences that should give a general picture of the background against which Italy's potential as a NATO aviation arsenal may be assessed.

Getting to Milan.—Milan, the industrial capital of Northern Italy, is now very accessible from London. British European Airways operates a daily Elizabethan service with a flying time of only two and three-quarter hours. Assembly time at South Kensington is at the leisurely hour of 10 a.m., and after the usual formalities of ticket checking, weighing, passports, currency, and the sedate coach-drive to London Airport, a few short steps take the traveller into the Elizabethan's spacious cabin.

On a summer journey the amenities of the Elizabethan are appreciated. The ground air-conditioning is working as one enters and gets one's always-too-numerous hand-baggage stowed in the ample double luggage racks. The engines are quiet on taxying out, and even at take-off they do not sound loud. The take-off seems short and the wheels fairly snap up into the nacelles. Climb away is steep and from the rearward-facing front seats the view is particularly good. Normally, the British coast is crossed at about 18,000ft and by the time the straight roads and geometrical brown patchwork of France are below an excellent lunch is being served.

Seen comfortably from 20,000ft, the Alps are magnificently picturesque but fail to create any sense of awe. The Elizabethan's air-conditioning (subject of criticism when the service first started) was excellent, and the "detached" feeling of comfort and security when looking down on Europe's most formidable mountains was striking. The width and height of the cabin, as well as the large windows and the high wing seemed to add to the sense of complete security—even if one had not listened to the captain's high praise of the Elizabethan's single-engined handling.

Malpensa Airport lies fairly close to the Alps, and a steep descent has to be made to get into the circuit. Privately owned by a group of business men from Busta Arsizio, a nearby industrial town, the airfield is a rather crude one reconditioned from a war-time Regia Aeronautica base, with a single runway and perimeter track. The facilities are the bare minimum required by considerable daily traffic from B.E.A., K.L.M., Sabena, Swissair, Air France, and T.W.A. There is a control tower, but all signals and met. services are transmitted by public telephone from the rival airport of Linate, four or five miles from Milan—Malpensa is over 20 miles from the city it serves. A wooden Customs building—in which one swelters for 15 to 30 minutes while baggage is cleared—and a small café complete the facilities. The airport restaurant, once the Regia Aeronautica mess, is in idyllic surroundings over a mile away. The journey into Milan, mainly along the *autostrada*, is taken at a *far* less sedate pace than that of the British airline buses.

Apparently there is a fierce tussle in progress between the proponents of Malpensa and Linate. There are powerful vested interests in the former, yet the Italian airlines use the latter. Strong efforts are being made to develop Linate, but its solitary runway is only about 900 metres long and much money will have to be spent before it is fit for anything larger than a Dakota. The owners of Malpensa are, naturally, holding on to their rights, since their dividends come from there, but they have not yet implemented their undertaking to improve facilities. The airline sales side strongly favours Linate because of the shorter bus journey, but the pilots prefer Malpensa because in winter (when Milan rivals London for fog) there are usually two clear hours a day, while Linate often remains obscured right round the clock. The best proposition for the operators would be to develop Linate, using Malpensa as an alternative; this, however, would be an expensive ideal.

But to return to Italian aviation in general. The first question that comes to mind is, of course, the political one. What is the relationship between Italian Communism and the Iron Curtain?

The Political Scene.—The danger of Communism is very real, not so much from its popularity with the Italians as from their innate sense of opportunism. Active revolution by the Communists appears to be unlikely, but on the other hand they are equally unlikely to resist an aggressor. In France there are some fanatical Reds who would die for their faith, but in Italy there are few of this breed.

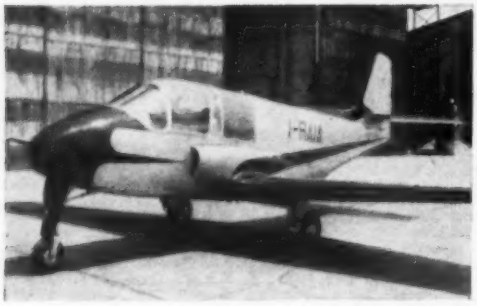
The Church, which has a strong hold on a largely peasant population, could be a barrier against Communism, but unfortunately undermines its own position by entering the political field with its own party. If the Church were to support all the anti-Communist parties a strong *bloc* could be established.

Living conditions are, of course, the key to the situation. Before the war there were fewer than a million convinced Fascists, yet the active party-members totalled ten million. These were the opportunists, but there were also many more who gave lip-service to "the faith" in order to eat. There is no doubt that the same drifting with the tide would occur under a Communist administration.

Manpower and Factories.—At present the aircraft industry is little more than a shadow. Many factories were heavily damaged and since there has been quite a lot of activity in rebuilding there is a very great deal of idle floor space.

There are only about 15,000 workers in the industry today, compared with 150,000 during the war—to which the accessory and allied industries added another 50,000. If only two-thirds could be brought back—and there is considerable unemployment

The Fiat G-80 jet trainer prototype beside a Vampire of the Aeronautica Militaire at the time of its early flight-trials. The second and third prototypes, with Ghost and Nene respectively, are now in an advanced state of construction.



The prototype Aero-Caproni-Trento F-5 light jet trainer/sports aircraft. The view on the left emphasizes the clean fuselage-lines and shows the neat fairing of the air intake duct. On the right it is seen in flight, piloted by Com. Zanlucchi and with its designer, Ing. Stelio Frati, in the rear seat. The F-5's Turboméca Palas turbine gives it a level speed of close on 250 m.p.h. Span is 25 ft 9 in, length 21 ft 9 in, and present all-up weight 1,655 lb

LOOKING ROUND ITALY . . .

in Italy today*—there would be a six- or seven-fold increase in production potential.

Finance is lacking, in fact it is worse than that, as exemplified by the crises of SIAI (Savoia Marchetti) and Breda. The present situation is partly due to the original disarmament policy and the post-war wait to see what would happen about Italian aviation. From 1945 to 1947 the major aircraft companies kept up their payrolls under government directive, and this made heavy inroads into capital. Some of the firms tried to recoup by making other products, but, as is so often the case with aircraft companies, the results were uneconomical. SIAI made a beautiful bicycle that sold for less than its manufacturing cost; Macchi built a three-wheel truck, although they at least had the advantage of a small staff, for their buildings had been largely destroyed.

Fiat Activity.—Fiat, on the other hand, had manifold interests to absorb labour and to make much-needed industrial equipment. They also had a production line of the G-59 fighter trainers, which was on a go-slow policy under German occupation, but made a lively recovery when an export order for the type was received from the Argentine—this line is just ending after re-equipping the Aeronautica Militaire.

After the loss of the G-80 two-seater jet-trainer prototype, due apparently to tail flutter, the second and third machines are now in hand. The second prototype, the G-81, will have a Ghost and should be finished by the autumn, but the third, the G-82 with a Nene, is only in the mock-up stage for the engine installation. A small series of Goblin-engined G-80 trainers is being laid down for the Aeronautica Militaire, intended for future service trials, and the Italians, naturally enough, are pushing it as a rival to the Fokker S-14 for the future NATO jet trainer; like the Fokker, the G-80 has the advantage over the Vampire and Meteor trainers of being fitted with ejector seats. The structure of the G-80 has a load factor of 19, so there is ample room for weight increase.

Fiat share the order for Vampires and Venoms for Italy with Macchi by making the wings. They are also making Vampire wings for de Havilland, and will continue with Venom wings later. In their shops can be seen the latest equipment for this work; a John Shaw 5,340-ton hydraulic platen press for detail parts, and Farman rolls for leading-edge skin forming.

At Lingotto, the famous Fiat plant with the test track on the roof, is the small gas-turbine factory. At present they are making and overhauling Goblins for the Vampires of the Aeronautica Militaire, but they have also just assembled their first Ghost from British parts, which will form the basis for future production of Ghosts for the French S.N.C.A.S.E. Venoms.

The Fiat G-49 two-seater advanced trainer was due to fly shortly after I left. It looks very like the *earlier* G-59 (!) but the structural design is more modern and all the latest ideas for a "Harvard replacement" have been incorporated. The first airframe and two further examples—one for structural testing, the other for an Alvis Leonides instead of a Wasp—are being built in production-type jigs. Fiat seem sure that they already have a production order.

Fiat are also negotiating with the U.S. for a licence covering the making of spares for the J-35 engines of the NATO F-84Gs.

The Piaggio Factories.—Piaggio, with factories at Pontedera, Genoa and Finale Ligure, also had wide general interests. The Vespa motor scooter is an example of an outside product made in a very commercial manner; it is designed by an aircraft engineer, Ascanio of helicopter fame.

At present the Finale Ligure factory is making the P-148 trainer, over twenty of which are already in service, and the initial order of 50 has been increased. This company is trying hard to get the P-148 adopted as the NATO primary trainer and to this end is negotiating for the Lycoming licence. At Finale a small additional series of the P-136 amphibian has been laid down.

The Pontedera factory, near Pisa, is now free-flight-testing the new Ascanio helicopter. It is, however, underpowered with the direct-drive Lycoming, and the geared GO-435-C2 model is to be installed shortly.

Project work includes the P-149, a four-seater version of the P-148 with a retractable undercarriage, and an intermediate trainer, the P-150 with Alvis Leonides. This is a scaled-up version of the P-148 and construction of the prototype is well advanced. It will lie between the P-148 and the G-59 operational trainer. The P-149 prototype and structural test units are nearly ready, but the Lycoming GO-435 engine for it is not expected until rather late in the year.

Other Famous Names.—Aeronautica Macchi of Varese are, as already mentioned, making Vampires; they do the fuselage, tail and final assembly. They are now also tooling for the Venom, and they hope for very large orders for the latter over the next two years. Macchi are also making jigs and fixtures for Hawker Hunter fuselages, and they hope to make the parts themselves later.

At Pomiliano, near Naples, the bombed Alfa-Romeo factory is nearly rebuilt and will soon go into production with Ghosts. The only current Alfa-Romeo work is the manufacture of D.H. Gipsy piston engines under licence.

Also near Naples is the state-owned Aerfer accessory plant, which has just obtained a licence to make spares for the NATO F-84Gs which are the later type with flight refuelling—worth some $5,000,000.

The Free-Lance Designers.—A curious feature of Italian aircraft manufacture is the existence of several free-lance designers. These are young men who graduated after the war and have found the industry too small to support them.

* *Mainly in the agricultural south, where much of the work is seasonal.*

A B.E.A. Elizabethan receiving Esso oil and Shell fuel at Malpensa. Behind it are the control tower and a T.W.A. "round-the-world" Constellation.

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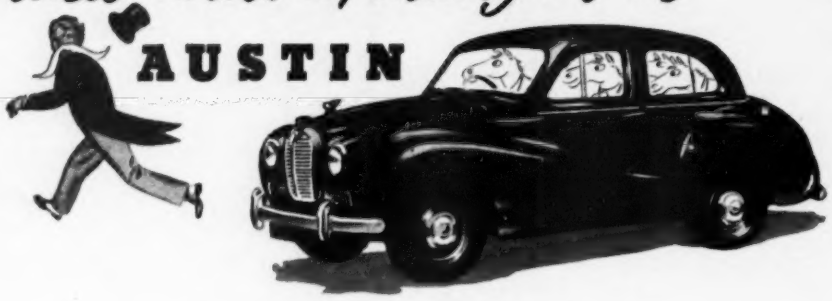
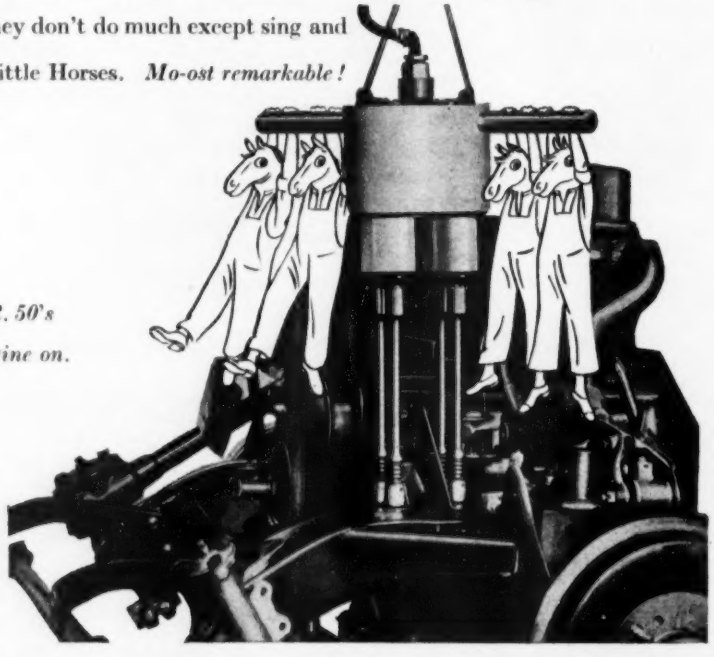
Four little horses depending on an AUSTIN



Mo-ost remarkable! — said the Managing Director, just returned from the new Austin Assembly Plant — they throw a handful of nuts and bolts on a moving platform and the next thing there's a fellow driving an A.40 off the other end. Of course it's my Little Horses who join the bits and pieces together. Little chaps called S.R.50 working singly or in teams of two, three or four. There are a few human beings about of course but they don't do much except sing and say "Hup!" to my Little Horses. *Mo-ost remarkable!*



Team of four S.R. 50's sticking the engine on.

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LOOKING ROUND ITALY . . .

One, Ing. Stelio Frati, has just had his little two-seater jet trainer complete by Caproni—actually a small remnant of this once powerful firm. This aeroplane, the F-5 with a Turboméca Palas engine, has just received its C. of A. (Ing. Frati's previous design, the F-4 *Rondone*, a side-by-side piston-engined racer, was built in a small series of ten by Ambrosini).

The F-5 has aroused a great deal of interest, and Aeronca are reportedly negotiating for a manufacturing licence. The Italian engine situation for this aircraft is curious : Piaggio were interested in a Turboméca licence, but they did not like the amount of scrap arising with the one-piece turbine-wheel/blade assembly; so while they were hesitating Fiat took an option on the licence—more to keep Piaggio out than because they wanted it.

Helicopters.—The Italian authorities are actively reviewing the question of a national helicopter programme, and hope to formulate a scheme by the end of the year. In the meantime some work is going ahead besides the development of the Piaggio. Agusta, a small company known for its light aircraft, has taken a licence for the Bell helicopter. Fiat, determined to be in the picture at every turn, has obtained the licence for the Sikorsky S-51 and S-55, although it has not yet started manufacturing either type.

Aviation Administration.—The aviation appropriation is part of the Defence Vote, which is shared by air, sea and land forces. In the Defence Ministry there are four under-secretaries (political) and a secretary-general for each branch whose duties are to act as liaison between the minister and the departments. The aviation interests are handled by General Silvestri, who has a *direzzione generale*, which includes Departments of Civil Aviation, Works and Buildings, Airports and Land Properties, Armament, Telecommunications (scheduled for transfer to NATO), Personnel, etc.

The Aeronautica Militaire is rather better served, since its branch is more cohesive and compact. The chief of staff, who is equivalent to a secretary-general, is General Urbani, who, like the heads of the other two services, is of "three star" rank—in Italian *generale squadra aerea*, or air chief marshal in our ranking. Deputy chief of staff is Divisional General Ludovico.

It is obvious from this that while the Air Force is on an equal footing in its struggle for existence with the other services, civil aviation comes off very badly, since it is dependent only in the third degree from parliament. This means that it has to scramble for money and, of course, it has no voice in parliament, where the members can only allocate a block appropriation for the whole administration. The future of civil aviation is now subject to the findings of a committee, some details of which appear elsewhere in this issue. [Page 220.—ED.]

Military Aviation.—Originally Italy was only allowed a small defensive force of fighters, but now she is being integrated into the NATO plan and already Italians are attending flying training courses in the U.S.A. and Canada, although the aim is to do all training in Italy.

Today the Aeronautica Militaire consists of four territorial Commands, with headquarters in Milan, Padua, Rome and Bari, and two "island commands," one in Sardinia, the other in Sicily. This regional control is being reorganized into three overall commands. Air Defence Command (Difesa Aerea Territoriale) will administer all operational units. Training Command will control three groups to meet the full NATO expansion programme, Group 1 in Southern Italy, Group 2 in Sardinia, and Group 3, still to be formed, in Sicily. Air Reserve Command carries out the general duties of the international service, using Cant Z.506 seaplanes for A.S.R., Piaggio P-136 amphibians for communications, and Fiat G.212 three-engined transports for supply dropping. There are also two independent transport wings, using Savoia-Marchetti S-82s, Fiat G.12s, and Beechcrafts as transports.

The air-defence units are divided into wings—corresponding in size with an R.A.F. group—and the wings into squadrons. Equipment consists mainly of Mustangs with a few Vampires—re-equipment of these units is at present scheduled for Venom day and night fighters. Each of the six territorial commands has a training squadron equipped with basic and advanced single-engined trainers (Harvards and Fiat G.59s) and some Beechcraft or SIAI 102s for communications, on which headquarters pilots can keep their hands in.

In an expanding air force it is the training system that is the key to everything. It is true to say that at present Italy is concentrating on national-service entries for her pilot strength. An important feature of this system is pre-entry flying training. Eighty Macchi MB.308 high-wing monoplane trainers were bought by the Aeronautica Militaire and leased to the flying clubs. On these young men learn to fly and to obtain their private pilot's licences under subsidy, after which they must either enlist as regular pilots, or as national service pilots for eighteen months to two years.

After enlistment the training programme consists of ten hours on

One of B.E.A.'s experimental Dart-Dakota freighters parked in the wilderness at Malpensa. In the background is a Swissair Convair 240

Stinson, Fokker S.11 or Piaggio P.148 elementary trainers (30 hours if there has been no pre-service instruction); 30-40 hours on the T.6 (Harvard), including gunnery and bombing instruction; a period of graduation from the Fiat G.59 two-seater to the single-seater and then the Mustang; and finally 8-10 hours on Vampires. By this time the trainee will have done about 150 hours and he is posted to an operational squadron, where, if he is a national service pilot, he will spend six months learning either interception work on Mustangs or tactical duties on Thunderbolts—next year, Vampires and Thunderjets respectively.

In addition to the air defence, or interception, operational units there are now two fighter-bomber wings under General Cupini, with headquarters at Vicenza, which form the first Italian contribution to 56 T.A.F. of the NATO Forces. One wing has Thunderjets and the other Thunderbolts; the latter unit is now awaiting Thunderjets.

NATO Production Programme.—In 1951 the Italians offered to provide a large number of trainers built with Italian money for NATO use in exchange for the financing of first-line types for the Aeronautica Militaire. The Venom was to have been the operational type, and, naturally, American opposition was strong—so the plan was killed.

Now the U.S. agreement to the principle of "off-shore purchases"—and, also, British interest in sub-contracting privately to Italian firms—has put a new complexion on things.

Because the Italian Government realized there was little hope of the U.S. financing day fighter Venoms, they decided to order the night fighter, knowing that there was a great need for this type in Europe and that the Americans had none to supply. A large programme to be completed quickly has been put forward, but here again the position is confused, since the financing arrangements are uncertain. Even for the night fighter, U.S. funds are unlikely to materialize and, presumably, the Italians think the sheer need for such aircraft will drive the individual NATO states to pay for their own orders. The present view in Italian Government circles is that "off-shore" money is more likely to be provided for trainers than for anything else.

The whole situation today is a case of wait-and-see. With characteristic Italian astuteness, there is always a "programme" ready to meet any contingency. These programmes can either be put vigorously into effect or dropped without regret—according to how the situation develops.

Postscript.—A full-dress meeting on July 31st underlined some of the points made in this article. The meeting, presided over by the Minister of Industry, Sig. Campilli, and attended by the senior members of all interested parties—Government, Air Force and industry—announced a new consolidated programme. Airframe and engine companies are to be re-organized into three main groups: North-west, Fiat and Piaggio; North, Macchi and SIAI-Marchetti; Central, Southern and "Island," Ambrosini, Alfa-Romeo, Pomigliano and Meridionali. There is also to be a complementary, or "backing-up" group consisting of Agusta, Cantieri Aeronavali, and a "reserve" group for sub-contract work. The smaller accessory manufacturers are not to be grouped.

The initial programme will cover trainers, fighters and helicopters. It is envisaged that a five-year plan will call for 18,000 aircraft to be split between the Aeronautica Militaire, NATO requirements, and, surprisingly, a third for "other exports." Costs are to be reduced by tax concessions and favourable financing terms are to be arranged—which sounds rather like subsidized exports.

Professor Valletta, President of Fiat, has welcomed this programme, but favours continued integration of civil and military work without separate control. General Urbani, Chief of Air Staff, on the other hand, pleaded for separate and energetic development of air transport—a view endorsed by the Minister of Industry himself.

G.A.L.60 precursor of the new Universal

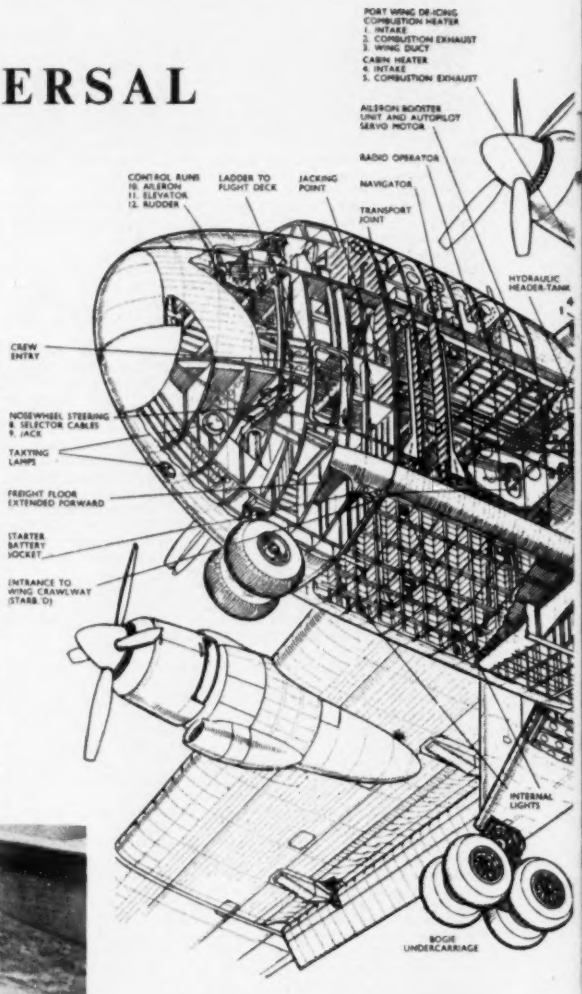
Mk 2 UNIVERSAL

Improvements and Alterations Following Experience with the Prototype Blackburn and General Aircraft Freighter

MOST people like elephants; they are docile, patient, immensely strong as beasts of burden, yet in their wild state agile and greatly respected by man and beast alike. A somewhat similar regard is felt for the Blackburn Universal (or G.A.L.65, in its latest wild, or military, form). This aerial beast of burden is huge and strong, yet capable of no mean turn of speed—nearly 240 m.p.h., in fact. Two years of development of the prototype, seen in the photograph, have resulted in the design of the more powerful Mk 2 depicted in this new *Flight* drawing.

The Universal is the largest aircraft of its kind, and is intended to transport bulky equipment of all kinds, particularly in undeveloped areas where only limited runway facilities are available. The makers have given consideration to carrying many types of vehicle, among which are such combinations as a 2 cu yd dumper and a drag-line excavator; a bulldozer and an earth scraper; road rollers; ore containers; and small diesel locomotives. Twin loading-ramps are provided at the rear of the freight compartment, and they may be carried in the aircraft if required. The maximum angle of inclination of the ramps is 15 deg.

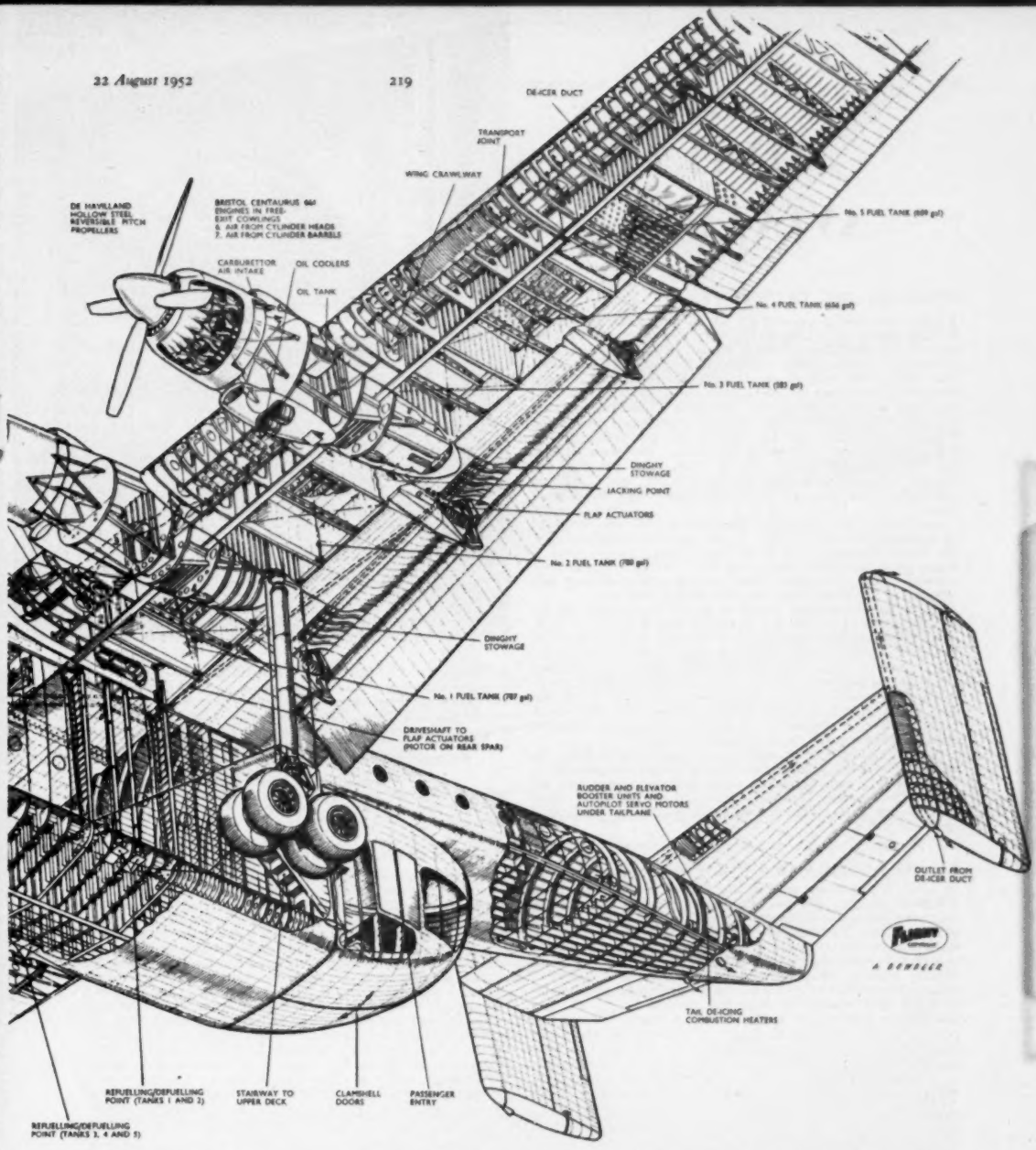
The cargo compartment itself measures 40ft x 10ft x 10ft and the aircraft has a volumetric capacity of some 6,000ft. The strength of the floor panels and supporting structure is sufficient for local loading of 21 lb/sq in and axle loads of 9,000 lb for vehicles. There are 170 lashing-points on the freight floor, and all fittings are capable of carrying an ultimate load of 5,000 lb. Forty-eight rotatable lashing shackles are supplied and three horizontal rows of one-ton lashing rings are provided along each side wall of the freight compartment.



Two mechanical methods of loading freight have been worked out: one by means of a hand or electrically operated winch designed for anchorage to the freight floor lashings; the other by means of an overhead gantry operating on removable rails.

In the passenger and car-ferry versions provision is made for such alternatives as high-density seating for 130, or a hold for six cars, five motor-cycles, and seats for 42 passengers. One hundred fully armed troops (see illustration) can also be accommodated.

Although the maximum weight of the Universal is 130,000 lb, it can be flown from grass airfields, its


DE-ICER DUCT
TRANSPORT JOINT
WING CRAWLWAY
DE HAVILLAND HOLLOW STEEL REVERSIBLE PITCH PROPELLERS
BRISTOL CENTAURUS 661 ENGINES IN FREE-EXIT COWLINGS
6. AIR FROM CYLINDER HEADS
7. AIR FROM CYLINDER BARRELS
CARBURETTOR AIR INTAKE
OIL COOLERS
OIL TANK
No. 5 FUEL TANK (609 gal)
No. 4 FUEL TANK (656 gal)
No. 3 FUEL TANK (583 gal)
DINGHY STOWAGE
JACKING POINT
FLAP ACTUATORS
No. 2 FUEL TANK (788 gal)
DINGHY STOWAGE
No. 1 FUEL TANK (787 gal)
DRIVESHAFT TO FLAP ACTUATORS (MOTOR ON REAR SPAR)
RUDDER AND ELEVATOR BOOSTER UNITS AND AUTOPILOT SERVO MOTORS UNDER TAILPLANE
OUTLET FROM DE-ICER DUCT
A. DOWDLES
TAIL DE-ICING COMBUSTION HEATERS
REFUELLING/DEFUELLING POINT (TANKS 1 AND 2)
STAIRWAY TO UPPER DECK
CLAMSHELL DOORS
PASSENGER ENTRY
REFUELLING/DEFUELLING POINT (TANKS 3, 4 AND 5)

fixed-type landing gear comprising two four-wheel bogies and a twin steerable nosewheel—ten wheels in all. Its take-off distance at maximum weight is 810 yd and its landing distance from 50ft to rest at 100,000 lb, using brakes and braking airscrews, is only 720 yd.

Differences between the prototype and the Mk 2, most of which may be seen in the drawing, are as follows :—

Engines and engine mountings.—Bristol Centaurus 661 engines, fan cooled, with individual exhaust pipes. The oil coolers have been moved forward, and the carburettor air-intake is on top. The inboard engine mountings are extended forward by one foot, to give tip clearance between the square-ended airscrew blades; the outer mountings will be moved outwards by one foot. The geometry of the tubular mountings is changed.

Interior.—The uninterrupted portion of the main cargo floor has been extended forward by two frames; two extra fuel tanks have been provided inboard; fuel-jettisoning equipment has been omitted. The servo-motors for the autopilot, originally under the cockpit floor, are now adjacent to the control-booster units on the front spar and below the tailplane.

Wings and tail.—Three degrees dihedral is now provided outboard of the wing transport-joints, which coincide with the ends of the flaps. The tail-boom top line has been raised by three degrees from a point above the front wing spar and the construction has been modified.

Loading.—Clamshell doors are fitted and a stairway is provided from them to the upper boom deck. Modified loading ramps are provided, and the prototype aircraft has now been passed for flight with doors removed to facilitate dropping of equipment.

CIVIL AVIATION

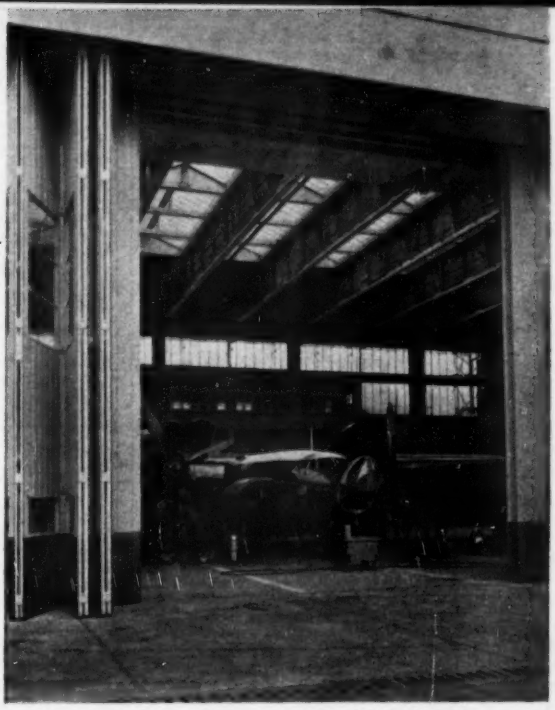
DOUGLAS JET TRANSPORT

IT has been obvious during the last month or two that something was at last boiling-up regarding American jet transports, and our American Correspondent was recently able to give some preliminary details about a projected Douglas DC-8. Now, according to *Aviation Week*, Douglas directors have decided to go ahead with plans for launching this aircraft without Government aid, and they are already exhibiting a full-scale mock-up to prospective customers. The venture is expected to cost Douglas between $30,000,000 and $40,000,000, and the selling price of the aircraft is likely to be about $3,000,000. The aim is to have the first production DC-8 ready in 1958. This action by the Douglas directors gives them a clear lead over both Lockheed and Boeing, who have not as yet crystallized their jet-transport plans.

According to the provisional specification, this first American jet transport will be of rather similar size and configuration to the Bristol Britannia, but it will have 35-deg swept wings, a single fin with similar sweep, and four "podded" Boeing-style turbojets. The four-wheel bogie landing-gear is located well inboard, to fold inward into the fuselage and wing root.

Estimated performance would be similar to that foreseen for the later series of Comets due in service with B.O.A.C. in 1957. The Douglas figures rely upon the availability of 15,000 lb thrust Pratt and Whitney J-57s. Earlier lower-powered versions of the unit, believed to have certain features in common with the Bristol Olympus, are now being fitted in some American military prototypes. The still-air range of the DC-8 for domestic duties will be 2,500 miles with an all-up weight of 180,000 lb. For longer-range work at a weight of 220,000 lb two wing-tip tanks of approximately 600 gallons capacity may be added.

A crew of five is to be carried, and, according to duty, the cabin layout would provide for between 70 and 100 passengers. Two fuselages with 130in and 150in diameter respectively are under consideration. Principal dimensions are quoted as: span 127ft; length 134ft. The cruising speed at 40,000ft is estimated to be 560 m.p.h.



"Flight" photograph

BRITISH EUROPEAN AIRWAYS are now beginning to feel the benefit of up-to-date equipment. Pictured here is one of their new Elizabethans—seen through the power-operated doors of the third hangar-bay in the maintenance base under construction at London Airport. When completed, this giant building will house the entire engineering staff of the Corporation at L.A.P.; its two hangars will be divided into ten bays—five for Elizabethans and five for Discovery-class Viscounts.

I.C.A.O. MISSION IN INDONESIA

AUSTER Aiglets and de Havilland Chipmunks will be used for basic training of Indonesian pupil pilots at a flying school which the Indonesian Government intends to open near Tangerang in November. The school is being organized by the I.C.A.O. mission to Indonesia, headed by Mr. E. L. T. Barton, who reports that there were 600 applicants in one day for training at the school; initially, however, there are places for only 40 pupils. The type of advanced trainer to be used has not yet been selected, but the choice probably rests between the Beechcraft and the Dove. The fact that Herons have already been ordered for internal services is a point in favour of the British aircraft. The mission is working in Indonesia on an international basis under the I.C.A.O. programme of technical assistance, and its main activity so far has been to set up a training school—for traffic control and signals staff, radio mechanics and ground engineers—at which nearly 90 Indonesian students are under instruction. Plans have also been prepared for new facilities and buildings at Kemajoran, which will make this airport one of the best in S.E. Asia.

ITALIAN CIVIL AVIATION

AS James Hay Stevens reports in his article on pages 215-217 of this issue, civil aviation in Italy has, since the war, been treated as something of a poor relative of the other services. Whether its position will improve now depends on what action is taken to implement the findings of a committee appointed in May of last year. Under the chairmanship of Senator Caron, this committee worked through a vast questionnaire compiled by the aircraft industry and the interested authorities, and recently evolved a set of answers and recommendations in the form of a "white paper"—which occupies no less than five metres of small type!

The findings confirm the need for a separate ministry of civil aviation and suggest that a temporary special civil aviation administration, with full powers in its own sphere and its own vote direct from parliament, should be set up at once to organize and establish the terms of reference of the new ministry. In particular, a system of airport administration is to be evolved, to work along-

SVAVAR VIKING, one of the eight DC-4s operated by Scandinavian Airlines System, is here depicted at Schiphol Airport, Amsterdam, in the new white-topped livery worn by all S.A.S. aircraft.

"Flight" photograph

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Royal Naval Air Station, St. Davids, Pembs. Speke Aerodrome, Liverpool. Usworth Aerodrome, Gateshead-on-Tyne, Co. Durham.

Photo: Eric Hosking, F.R.P.S.

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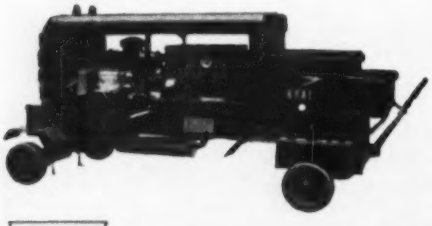

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CIVIL AVIATION...

BIG DAY FOR BRISTOL: As reported on page 200, the Bristol Britannia made a successful first flight on Saturday. High power and low consumption are not the only virtues of the Britannia's four Proteus turboprops: the take-off (right) is reported to have been "remarkably quiet."

side the Aeronautica Militare, which at present is alone responsible for airfields.

The committee further recommends buying out the B.E.A. and T.W.A. interests in L.A.I. and Alitalia, the two companies to remain on a wholly Italian-owned and Italian-operated basis. The question of fleet replacements is to be investigated and arrangements for loans made for this purpose. A mail subsidy is to be established and certain uneconomical, though necessary, routes are also to be subsidized.

On the question of the industry, the committee recommends that production should be resumed, starting with medium-sized civil types. They also hope to organize standardization of as much equipment as possible between the civil and military sides. This work would devolve largely upon the Association of Air Industries (A.I.A.), the Air Carriers Federation (Fedaereo), and the Aeronautical Society (A.I.D.A.).

SABENA ORDER LIFTMASTERS

TWO Douglas DC-6A Liftmasters have been ordered by Sabena for delivery in August, 1954, bringing to 25 the total number of these high-speed cargo aircraft sold by the Douglas Aircraft Corporation. The first European operator to order the type (earlier this year) was K.L.M. The new Sabena order follows the company's decision to order eight DC-6B passenger transports —powered, like the DC-6A, with four P. and W. engines of 2,500 h.p.—to augment its present long-range fleet of five DC-6s.

I.A.T.A.'s ANNUAL MEETING

SWISSAIR will act as host to some 200 delegates of the eighth annual meeting of the International Air Transport Association, which is to be held this year in the Palais du Conseil General at Geneva from September 15-19th. At the meeting Dr. Walter Berchold, president of the Swiss airline, will take over from Sir Miles Thomas of B.O.A.C. as the new president of the association. Representatives of I.A.T.A.'s 67 member airlines will attend, together with observers from other international organizations, governments and like agencies. The delegates, most of whom will be heads or senior executives of airline companies, will lay down the broad lines of policy for the standing committees and traffic conferences, form instructions for the director general as to views they wish placed before I.A.C.O. and other bodies, elect officers and fill committee vacancies. Tourist services and jet operations will, it is expected, be discussed on the level of general policy.

CHARTER NOTES

BRITAIN'S independent air-transport operators experienced only a moderate week of charter business during the seven days ending August 17th. Excluding trooping flights, about 85 trips were completed, most of them over comparatively short distances. The total mileage flown was about 35,000; of this amount 22,000 miles were covered on passenger charters and 13,400 on freight work; approximately 800 passengers and 350 tons of freight were carried. Some 35 per cent of the week's business consisted of student flights between some of the principal cities of Europe; freight flights between Berlin and Hamburg amounted to a further 35 per cent and the remaining activity was largely made up by two long-distance trips.

Dakotas were the aircraft in greatest demand, being called upon to complete 12,000 revenue-miles; Yorks flew approximately 10,500 miles and Bristol Freighters and a Tudor some 6,500 miles each. The estimated revenue from these flights was £15,000 and the number of hours flown, 225.

Longest flight of the week was performed by an Air Charter Tudor which returned from Johannesburg with 25 passengers and 3,700 lb of freight; the Tudor was due to leave for Tokyo on August 18th. Scottish Aviation completed a return Dakota flight to Dukhan with a mixed load of passengers and freight for the Iraq Petroleum Company. Scottish also made three return scheduled passenger trips between Northolt and Dublin on behalf of Aer Lingus (relevant statistics have not been included in the above calculations).

Forty-five students were flown from Copenhagen to Paris in an Eagle Aviation York and a further 45 were taken back to Denmark. Skyways also took students to Copenhagen, 46 for the Y.W.C.A., and brought 45 home. On behalf of the National Union of Students they took 45 passengers to Barcelona and returned with 39 more. A Skyways York based in Hamburg completed a round trip Hamburg-Hanover-Berlin-Hanover-Hamburg with 44 passengers; this company now has 16 Yorks in service.

Silver City Freighters were confined to short flights which could be operated in conjunction with the busy cross-Channel car ferries. They flew ten tons of cheese from Le Touquet to Lympne and a smaller consignment of the same produce from Cherbourg to Southampton. Two cars were flown from Blackbushe to Brest and 30 passengers and 2,400 lb of freight were carried from Blackbushe to Jersey for a film company. Horse flights during the week consisted of two trips from Lympne to Deauville with eight of Lord Cowdray's polo ponies, and a flight from Cambridge to Deauville with one horse, including a stop at Blackbushe to pick up two more.

One of the busiest firms last week was B.K.S. Aero Charter, owners of two Dakotas. They completed four fully loaded return trips to Basle, carrying 32 students in each direction, two return trips to Paris with similar loads and one flight from Southend to Munich, also with 32 passengers. Air Charter Yorks and Silver City Freighters made 54 cargo flights between Berlin and Hamburg.

BREVITIES

SIR GEORGE CRIBBETT, Deputy Secretary of the Ministry of Civil Aviation, is visiting Australia to take part in discussions at Canberra with the Australian and New Zealand Ministers for Air. The meeting will review the future of air transport operations of joint interest to the three Governments.

* * *

Two new appointments are announced by the Hunting group of companies. A. Cdre. G. S. Shaw, who was director of Personal Services at the Air Ministry until his recent retirement, has been appointed group liaison officer; M. J. L. Logan, formerly secretary of the Airbrokers' Association at the Baltic Exchange, has joined the head office staff of Hunting Air Transport, Ltd.

* * *

America's Civil Aeronautics Board is reported to be leaning towards the opinion that rearward-facing seats offer greater safety in crashes. The subject is so controversial, however, that (for 1952 at least) the annual C.A.B. revision of safety rules is not likely to include a requirement for commercial installation of such seats.

* * *

According to a report from Amsterdam, K.L.M. have decided to buy a Sikorsky S-55 helicopter; whether or not the S-55 would be one built under licence in England by Westland's is not stated. The report adds that K.L.M. hope to have two S-55s in service by the end of 1953. It will be recalled that the two transatlantic S-55s of the U.S.A.F. recently looked in at the Dutch national air display at Ypenburg on their way from Wiesbaden at the request of Dr. Albert Plesman, president of K.L.M.

FROM THE CLUBS

FULLY AEROBATIC, and capable of 132 m.p.h. on a 130 h.p. Gipsy Major 1, the Aiglet Trainer is proving one of the most popular in the long line of Auster light planes. Flying a similar aircraft to the company's demonstration machine pictured here, Mr. Tom Hayhow has set up 27 point-to-point records in the last few months—the latest, subject to confirmation, being a 6 hr 56 min flight from Madrid to London (790 miles).

THE Southern Aero Club's Air race-meeting, to be held on Saturday, September 13th, at Shoreham Airport, will be preceded by a lunch patrol at 1130-1200 hr; conditions will be the same as for previous patrols. Two air races will be held in the afternoon. The first is for the Southern Aero Club Challenge Trophy, to be run over three laps of a 15 mile circuit, starting and finishing at Shoreham Airport. Entry fee is three guineas and each competitor must provide proof of third party cover to the extent of £20,000. The race is open to British aircraft of up to 3,858 lb all-up weight and with a maximum speed of not less than 90 m.p.h. There will be a prize for the last man home. Entry forms and regulations can be obtained from the Secretary, Southern Aero Club, Shoreham Airport.

For the second race, the Southern Aero Club are inviting members of the Throttle Benders' Union to take part in an invitation air race over a closed circuit of five miles; that is, three laps of five miles each, starting and finishing at Shoreham Airport. It will be the first time that such a short course has been flown since 1937. The whole of the race will be visible for the spectators. The organizers are hoping also to provide aerobatics, jet demonstrations and joy rides.

WHITE Waltham has now been named by the Vintage Aeroplane Club as the venue for its proposed rally on August 30th. The meeting will begin at 1100 hr, and visitors are asked to land not later than mid-day. Among the events of the afternoon will be a demonstration parachute-descent by Miss Phyl Weir (originally a pupil of "Dumbo" Willans and lately returned from "finishing school" at a French parachuting centre), a hedge-hopping contest, and a mock battle between the Gladiator and Hart. In tomorrow's Siddeley Trophy Race at Baginton, the club will be represented by five pilots—Ron Gillman, Neville Duke, Geoff Alington, Jimmy Rush and David Ogilvy, flying, respectively, the Avian, Tomtit, Cowper Swift, Falcon Six (ECC) and Cadet.

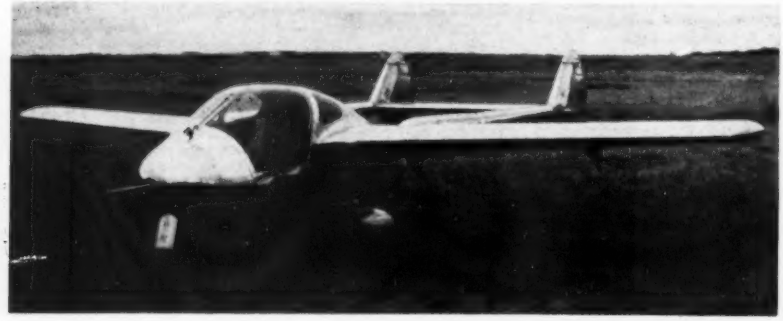
HOURS flown by the Herts and Essex Aero Club during June added up to 413, making a grand total of 1,752 for the first half of 1952. There were 23 first solos during this period.

Licences have recently been obtained by T. J. Bainbridge, F. J. Boswell, G. R. Brunet de Rochebrune, F. A. M. Buckland, C. J. Hasler, Miss E. Jackson, D. M. Nelson, C. E. Pain, A. C. Swire, A. L. Tebbit, T. B. Warren and D. Wetton. Newest private owner at Broxbourne is Mr. Ronnie Riches, who learned to fly at the Club two years ago and is now the owner of Messenger AJKL.

IN its report for the financial year ended March 31st, the Royal New Zealand Aero Club makes it plain that its 25 affiliated members have to fight as hard for survival as their counterparts in this country. Mounting costs, states the report, are a source of worry and "there appears, unfortunately, to be only one really adequate solution . . . the recognition by the Government that aero clubs are a necessary adjunct to the well-being of New Zealand and the expression of this feeling in a long term scheme of assistance upon which the clubs can plan their activities." Negotiations for such assistance have been carried on for the past year but the club records with disappointment that no definite decision has been made by the Government.*

The major source of income for the clubs during the year under review was payment at £4 15s per hour for training and refresher flying by A.T.C. cadets, who logged 5,310 hours. The report comments that while the £25,000 earned in this way might seem a substantial sum, over £18,000 went to seven clubs in the main centres and the remaining fourteen clubs participating in the scheme received an average of only £467 each.

** At we go to press, news comes that the New Zealand Government has decided to spend some £57,000 on the training of pilots by flying clubs during the coming year.*



FLYING AGAIN at Villacoublay after a number of airframe modifications is the two-seat SIPA 200 prototype, which is powered by a 330 lb s.t. Turboméca Palas turbojet. Speed range is reported to be between 56 m.p.h. and 248 m.p.h.; rate of climb is quoted as over 1,500 ft/min.

SERVICE AVIATION

Royal Air Force and Naval Aviation News

Air Minister's Tour

THE SECRETARY OF STATE FOR AIR, Lord De L'Isle and Dudley, V.C., arrived in the Canal Zone on Wednesday of last week on the second stage of his 8,000-mile tour of Royal Air Force units in the Middle East. He had already spent two days in Malta, staying with the Governor at Verdala Castle, and had stopped at El Adem for a short time. When he arrived at Fayid he was accompanied by A.V-M. S. H. Strafford, Commandant-General of the R.A.F. Regiment, who, in October, will become Inspector-General of the R.A.F.

After visits to H.Q. M.E.A.F., No. 206 Group at Abyad, and R.A.F. stations at Abu Sueir and Deversoir, the Minister's programme includes trips to Cyprus; Amman, Jordan; Habbaniya, Iraq; Bahrein and Sharjah in the Persian Gulf, and Aden.

He intends to return via R.A.F. Idris—formerly Castel Benito—and should reach Britain on August 28th, in time to see the S.B.A.C. Display.

R.A.F. Appointments

THE Queen has approved the appointment of A.V-M. H. T. Lydford, C.B., C.B.E., A.F.C., and A.O.C.-in-C. Home Command, in succession to Air Marshal Sir Ronald Ivelaw-Chapman, K.B.E., C.B., D.F.C., A.F.C. Assuming the acting rank of air marshal, he will take over at the end of September. A short while ago it was announced that Air Marshal Sir Thomas Williams would be the new C-in-C. of Home Command, but owing to his continued ill-health, the appointment has had to be cancelled.

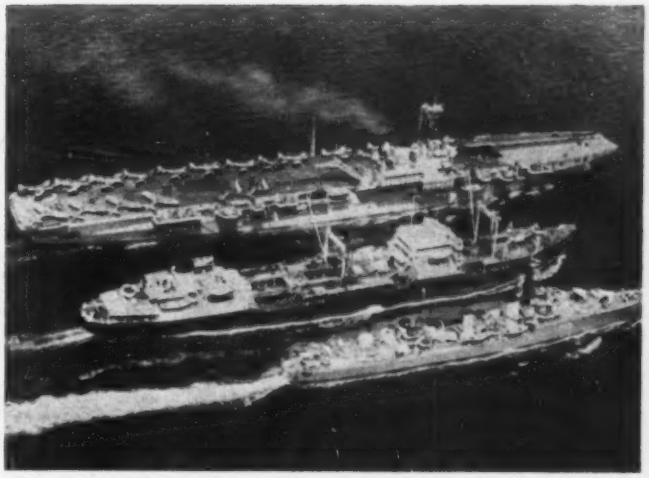
A.V-M. Lydford is at present A.O.C. 18 Group, Coastal Command, and Senior Air Force Officer in Scotland. He is also Air Commander Northern Sub Area under the Supreme Allied Commander, Atlantic.

Formerly S.A.S.O. at Air Headquarters, Iraq, A. Cdre. V. S. Bowling, C.B.E., has recently taken up the appointment of A.O.C. Cyprus. He has been serving in the Middle East Air Force since September, 1950, and, before going to Iraq, commanded R.A.F. Station Deversoir.

On August 16th, G/C. H. L. Maxwell, C.B.E., D.S.O., took up an appointment as Assistant to the Deputy Supreme Commander (Air) at S.H.A.P.E. He will assume the acting rank of air commodore. Until recently A. Cdre. Maxwell has been Deputy Director of Plans on the Inter-Service Joint Planning Staff.

After having been for some while Deputy Director of Organization (Establishments) at the Air Ministry, G/C. M. D. Ommaney has been granted the acting rank of air commodore and will take over the Organization directorate.

Another appointment recently announced is that of G/C. J. G. Flewett, D.S.O., who now becomes Senior Ground Defence Staff Officer at H.Q. 2nd T.A.F. in Germany. He, also, will assume the acting rank of air commodore.



FILLING THE OCEAN: The British light fleet carrier H.M.S. "Ocean" and its attendant Canadian destroyer H.M.C.S. "Nootka" being refuelled at sea off the Korean coast. The refuelling ship is the Royal Fleet Auxiliary "Wave Prince."

Air Commodore Flewett was formerly a brigadier in the Indian Army, from which he retired in 1948. He was first commissioned in the R.A.F. Regiment in January, 1950.

S/L. Jagger

WE regret to record the death of S/L. Jack Jagger in an air accident near Coningsby on August 14th. At the time he was flying a Meteor 8 from Linton-on-Ouse, where he had recently taken over command of a fighter squadron.

From 1951 until April of this year he was the regular adjutant of No. 600 (City of London) Squadron, R.Aux.A.F., the unit of which the Queen Mother is the Honorary Air Commodore.

S/L. Jagger was a brilliant solo aerobatics pilot and had trained an aerobatic team in his squadron. During the war, in 1941, he was shot down and captured, but two years later he escaped and returned to operational duty.

A.O.C. Malaya

AS already announced (*Flight*, August 8th), A.V-M. F. R. W. Scherger, is the newly appointed Australian A.O.C. Malaya. In 1943 he commanded No. 10 Operational Group in the South-west Pacific and was in charge of the Allied air forces during the landing at Aitape. Since the war he has attended the Imperial Defence College in Britain.

A.V-M. Scherger, C.B.E., D.S.O. A.F.C., R.A.A.F.

A.A.F. Staff Appointment

FOLLOWING the announcement of a staff re-organization by General Lauris Norstad, C-in-C. Allied Air Forces, Central Europe, A.V-M. J. L. Plant, R.C.A.F., Assistant Chief of Staff (Logistics and Personnel) has been raised to the status of one of the C-in-C.'s major deputies.

Hitherto all activities of Allied Air Forces, Central Europe, have been monitored by a Deputy for Operations, A.V-M. T. G. Pike, R.A.F., and a Deputy for Administration, Brig.-Gen. William T. Thurman, U.S.A.F. The concentration of A.V-M. Plant's staff will be solely on logistics, his previous personnel task having been transferred to the Deputy for Administration.

The actual scope of supervision for A.V-M. Plant and his staff will be in establishment of priorities, the co-ordination of logistics plans, infra-structure (air-base construction), supply organization, maintenance procedures, and general movements of all types.

The new staff re-arrangement within logistics makes Colonel Ephraim M. Hampton, U.S.A.F., second to A.V-M. Plant, with the title of Assistant Chief of Staff, Logistics.

Malayan Operations

THE number of offensive sorties flown during the month of July by aircraft of the R.A.F. and the R.A.A.F. showed a marked increase compared with previous months. The majority of the sorties took place in support of ground operations in Perak, with targets in Johore and Selangor also receiving attention. Hornets, in support of one ground operation alone, flew 105 sorties, and R.A.A.F. Lincoln bombers in the same operation made ten night air strikes.

Vampires made a series of attacks in Johore on a terrorist encampment situated on a small piece of high ground surrounded by swamp, to which unseen approach was almost impossible. On a number of occasions they were also used in support of security forces which required immediate support to dislodge terrorists from vantage

SERVICE AVIATION . . .

points. During the month there was an increase in the amount of supplies dropped by R.A.F. Valettas and R.A.A.F. Dakotas, the former dropping three-quarters of a million pounds of rations, mail and other requirements to jungle patrols on some 130 dropping-zones throughout the Federation, while the latter made a number of drops to isolated police posts in Southern and Eastern Malaya. The weight of supplies dropped from aircraft of both air forces since the commencement of the emergency now totals about eleven million pounds. In addition, one-and-a-half-million leaflets were dropped in the Kuantan area of Pahang, the Kuala Langat area of Selangor, and in the states of Kedah and Perak.

During the month 36 casualties, suffering from wounds or from fever, were evacuated from jungle clearings by helicopters of the Far East Casualty Evacuation Flight. Air cover was supplied by Hornet aircraft to a number of road convoys, notably those taking Gurkha families and school children from the Cameron Highlands to Tapah Road.

Maritime patrols by Sunderlands of the Far East Flying Boat Wing and photographic reconnaissances were also flown.

No. 612 Squadron Fund

FORMER airmen of No. 612 (City of Aberdeen) Squadron, R.Aux.A.F. are invited to claim shares in the squadron's 1939 fund, which is being disbursed. It is estimated that about 100 men are entitled to participate.

Those who were on the strength of the unit on September 3rd, 1939, and who have not previously received grants from the fund, or its predecessor, the 612 Squadron Resettlement Committee, are entitled to be included in the distribution of the surplus money, which is in the region of £500.

The Resettlement Committee, which was instituted in 1944, received generous support from the people of Aberdeen by voluntary subscriptions. The creators of the fund were W/C. G. R. Thomson, a former squadron adjutant, Mr. James Scott, Councillor James A. Mackie, and Mr. William Veitch.

During its existence, the committee gave valuable assistance to personnel and their families. It found employment for applicants, gave assistance to several who emigrated, and provided grants to those in need, and for educational purposes.

It was dissolved in 1948 after it had fulfilled its purpose, and the No. 612 Squadron 1939 Fund was formed in its place to give assistance to any who still required it. Before it is finally distributed, a small portion of the fund will be devoted to the unit's memorial fund. Applications for participation in the distribution should be sent to Mr. G. H. Scott, Kilburn, Pitfodels, Aberdeenshire.

SEEING THE SIGHTS: Mr. W. J. Taylor, M.P., showing some of the Canadian air cadets, now in this country, over the Houses of Parliament. Mr. Taylor has been largely responsible for the exchange visits of cadets.

ARABIAN NUCLEUS: G/C. P. L. Donkin, Commanding Officer of the R.A.F. Operational Conversion Unit at Chivenor, Devon, congratulates P/O. Zahair on completing his course successfully. On the right is P/O. Quaja and in the centre is Mr. Nazir, from the Saudi Arabian Embassy. (See "Saudi Arabian Air Force" on this page.)

Saudi Arabian Air Force

A NUCLEUS of the new Royal Saudi Arabian Air Force is being trained in Great Britain and the first two Saudi Arabians have passed out from the Operational Conversion Unit at Chivenor, North Devon, as fully qualified jet-fighter pilots.

The conception of a Royal Saudi Arabian Air Force goes back several years, to the setting up of a civil air training mission at Taif with the co-operation of the British Government. From among those trained there, nine were selected to be sent to Air Service Training, Ltd., at Hamble, Hampshire, to qualify as commercial pilots. At this time, however, the late Prince Mansour, then Minister of Defence, was discussing with two ex-R.A.F. officers in the British Mission the possibilities of creating a Royal Saudi Arabian Air Force. His father, King Ibn Saud, approved the scheme; and Prince Mansour, with the aid of W/C. R. S. Mills, D.F.C., of the R.A.F. liaison team, completed his first limited plans.

In the interim the nine young pilots sent to England had finished their course at Hamble but, instead of returning home, as they had expected, they were told that they were now to train as pilots with the R.A.F. They went first to Finningley in Yorkshire, in January, 1951, where they flew Harvards and Spitfires. From Finningley the nine Saudis went through the Officer Cadet Training Unit at Spitalgate, Lincs.

Other young Saudis have in the meantime come to England. There are now some eighteen training or about to train at various R.A.F. units. Three are flying jet aircraft at Advanced Flying Schools, in North Wales and Somerset, and three more are at the R.A.F. Technical College, Henlow, Beds., taking an engineering course between spells of flying training. The first two to complete their training are P/O.s Asaad Zohair and Achram Kamal Quaja, seen in the photograph above.

More School Gliders

FIVE more schools are now due to receive primary gliders from the Air Ministry for use by the R.A.F. sections of the Combined Cadet Force.

The schools are: George Heriot's School, Edinburgh; Whitgift School, Croydon; Clifton College; Edinburgh Academy; and Worcester Royal Grammar School. This distribution will bring the total up to about 40.

The gliders issued are of the new Slingsby Primary type, which has been modified in such a manner that the boys themselves can mount it on a 7ft-high tubular tripod, on which it balances so that it can swing through 30 deg in any direction. The glider is then turned to face the wind. With only a light breeze blowing over the surfaces the controls become effective and the pupil can learn their reactions without leaving the ground.

When the pupil has the feel of it, the glider can be taken off the tripod and launched over the playing field by a winch or rubber catapult. The glider is intended only for gentle manœuvres at a height of between 40 and 50ft.

Reunion

THERE will be a reunion of all ex-members of No. 164 (Argentine-British) Squadron R.A.F. It will be held at the Rose and Crown, Sloane Street, London, S.W.1 on Saturday, October 11th, at 7 p.m.

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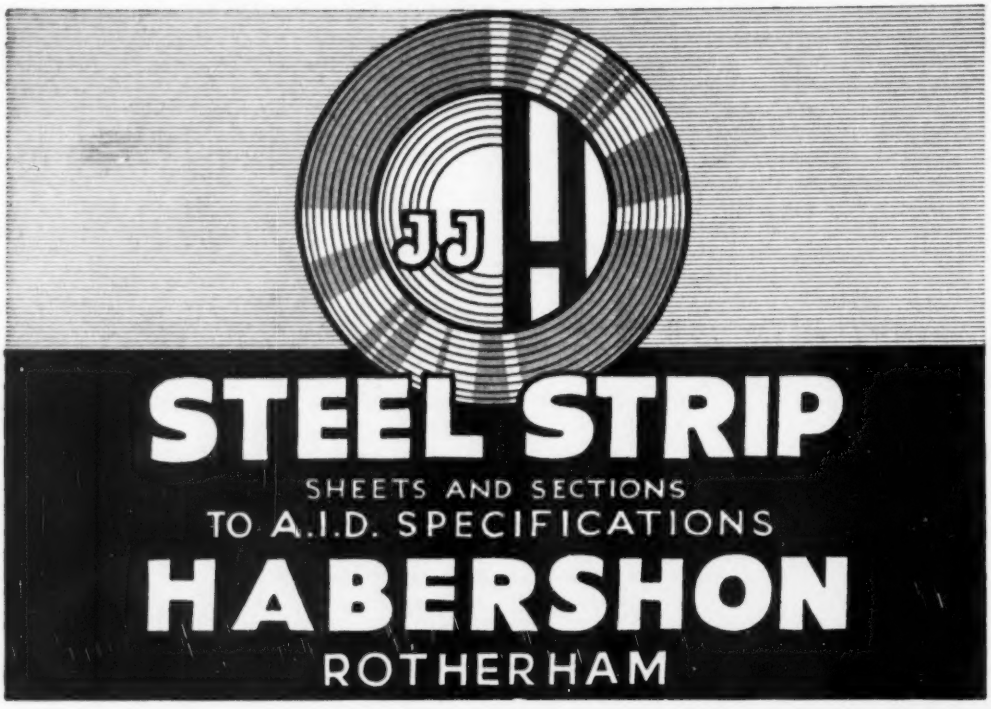

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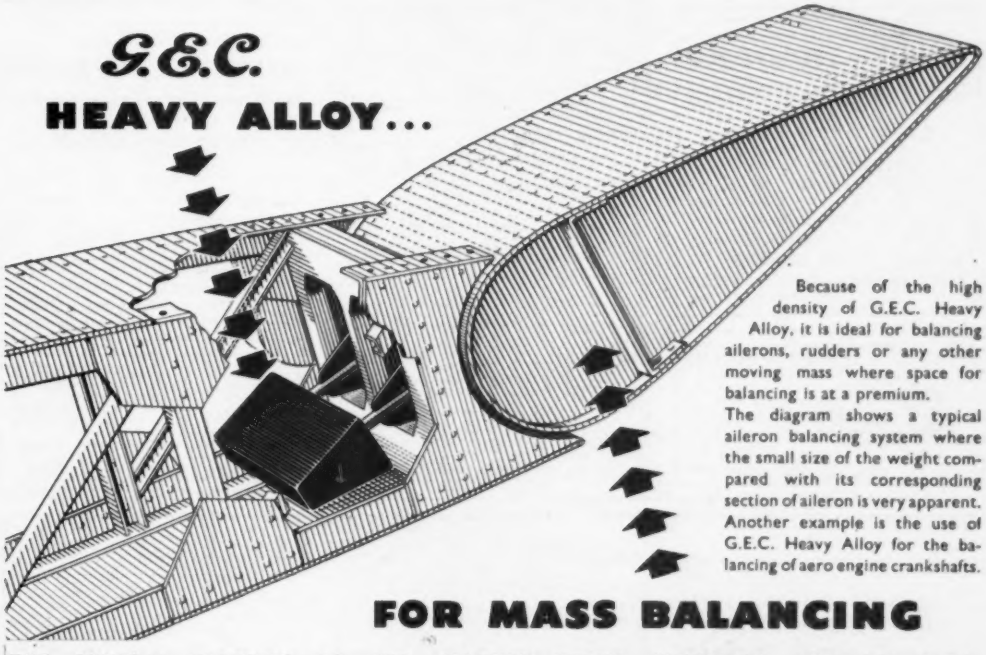

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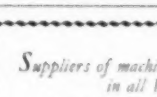

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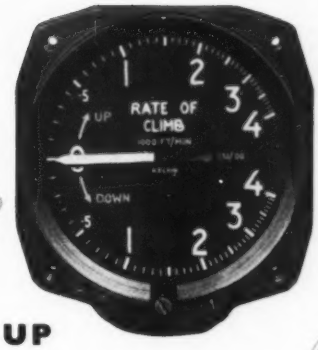

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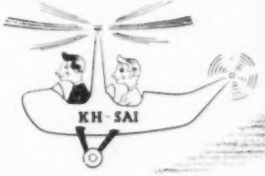

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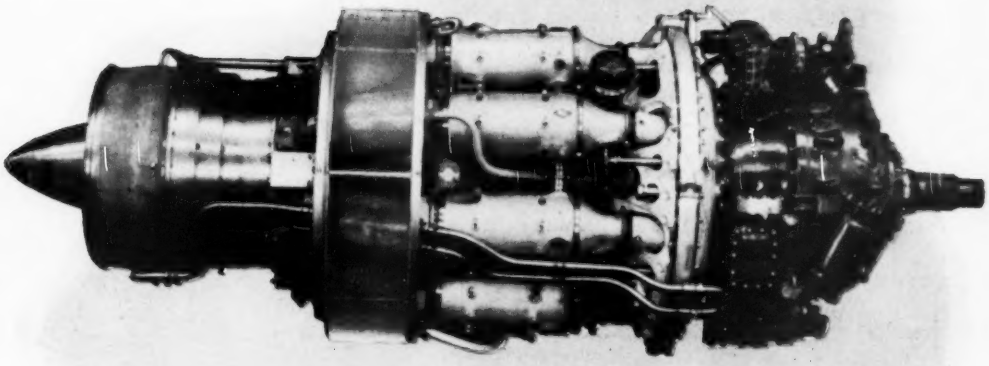

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